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ABSTRACT

Intended for teachers, this book reports an assessment of reading achievement in the Irish schools of first year postprimary pupils. Chapters discuss background information, the research procedure, the survey findings, "backwardness" in reading, and the researcher's conclusions. The book concludes with an abstract that lists some of the chief findings of the survey, including the following: (1) the mean reading achievement of boys and girls did not differ significantly; (2) 5% more boys than girls were backward readers; (3) four times more boys than girls were disabled readers; (4) differences in inductive reasoning ability accounted for one-third of the variation in reading level; (5) variations in age, attitude, and interests affected standards; (6) reading interests and habits varied considerably; (7) more backward readers attended vocational schools; (8) reading difficulty was more prevalent among pupils from lower socioeconomic groups and agricultural backgrounds; (9) reading problems showed no clear relationship with school size in the secondary sector; (10) many heads of school were aware of a reading problem; and (11) some evidence from this report supports Cattell's theory of fluid and crystallized intelligence as a helpful context for distinguishing between reading comprehension and abstract reasoning.

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READING STANDARDS IN IRISH SCHOOLS

A national survey of reading standards and related aspects of first year pupils in post-primary schools in the Republic of Ireland, 1971-72.

by
T. Desmond Swan

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Where credit is due

Many persons have advised, encouraged or otherwise assisted me in the course of this survey. To each one I gladly express my sincere gratitude.

The idea of such a survey as this was prompted initially by encountering children with reading difficulties in the course of many years' work both as a primary and post-primary teacher, and again as a psychologist in Dublin, Meath, Kildare, Westmeath and Carlow. In due course the response of the school authorities, principals and pupils throughout the country to my request for co-operation in the survey was both prompt and encouraging. Willingly given, it is now gratefully acknowledged.

So many people were found ready to help or even to sit down and talk through problems as they occurred, that it would be impossible to thank each one by name. And yet one feels a keener indebtedness to some. Here I would mention especially Professor E. F. O'Doherty and Dr. Michael Nolan, Dr Joyce Morris, Mr. Geoffrey Peaker, Mr. Alan Brimer, Mr. John Raven, Mr. John Mitchell, Mr. Breffni Tomlin, Mr. Joseph McNally and Mr. Fergus McBride. While their expertise was generously shared they bear no responsibility for the decisions taken.

Mr. Desmond Hourihane who was full-time research assistant to the project for 1971-72, proved an incomparable colleague. The officials of An Roinn Oideachais deserve a sincere tribute, especially those who so promptly made essential statistical data available on several occasions. The staff of both the Computer Laboratory and the Library at U.C.D. were likewise unstintingly helpful over a long period of time.

The research was made possible in the first instance by the imaginative policy and generous financial assistance of the Educational Company of Ireland Ltd., who are of course its publishers. Publication was also greatly facilitated by funds from the International Reading Association.

A special word of gratitude must go to Mrs. Joan Shortt who typed the work, to Sr. Columban Swan, Mr. Jack O'Callaghan and my wife Mary – all of whose patience was indeed tried but never found wanting.

Desmond Swan

To Sara, Niamh, Michael and Cliona

The sooner we cease thinking of reading as something that concerns mainly infant teachers, and regard it as being of supreme importance up to University level the better.

Joyce Morris, 1972

If we are anything we must be a democracy of the intellect.....The democracy of the intellect comes from the printed book.

J. Bronowski, 1973

And so to completely analyse what we do when we read would almost be the acme of a psychologist's achievements, for it would be to describe very many of the most intricate workings of the human mind, as well as to unravel the tangled story of the most remarkable specific performance that civilisation has learned in all its history.

E. B. Huey, 1908

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Reports dealing with selected aspects of the research presented here have already been published in the following sources:-

Bulletin of The British Psychological Society, 27, 9, 87-88; *Compass, Journal of the Irish Association for Curriculum Development*, 6, 1, 14-31; D. Moyle (Ed.) *Reading. What of the Future?* London, Ward Lock Educational, 1975; J. Marshall (Ed.) *Proceedings of the First Conference of the Educational Studies Association of Ireland*, University College Galway, 1976; V. Greaney (Ed.) *Studies in Reading*. Dublin, Educational Company, 1977.

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FOREWORD

The growth of educational research belongs to the present century, following upon the untidy beginnings of national systems of education which had swept virtually all children into school in order to acquire the cachet of an ill-defined level of literacy and numeracy. This statutory population explosion engendered some anxiety amongst the teachers over a task that seemed suddenly to be less straightforward and more technical than their Herbartian indoctrination had foreseen. But the appearance of a new brand of psychology, emphasising measurable individual differences, held optimistic promise of direct, if often too crudely conceived, relevance.

This psychology applied to education was to ramify well beyond the prescriptions of the "measurement movement" into the complexities of motivation and learning, of educational programmes and pupil response—and much more. Research upon captive school children proliferated, acquiring gradually a degree of genuine scientific sophistication, as well as directedness and ethical responsibility. It was Ireland's good fortune that educational research was achieving a respectable maturity before breaking upon the Irish scene after the 1939-45 war. During the past quarter-century, in the universities, and in the vigorous research units established in Dublin and Belfast, much highly significant enquiry has been accomplished, more than capable of bearing comparison with the substantial studies already conducted elsewhere.

It is to this scientific progress that Professor Swan's very professional study of reading attainment in the Republic has made an impressive contribution which provides an empirical and conceptual starting-point for further investigation within

the Irish school system. Swan's survey of the reading performance of first-year post-primary pupils is meticulous as to its planning and the smooth administrative efficiency of its execution. The validity of his findings, and their capability of generalisation over the entire first-year secondary cohort, are assured. These results have an added importance in the broad context of European literacy studies. (ii)

No comparable nation-wide examination of attainment in reading has hitherto been attempted in the Irish Republic. In this regional context, Swan's work provides a basic assessment of achieved literacy at a crucial stage in the school-life of all pupils. This is effectively a base-line for the most pervasive of all learned skills, against which change in performance can be gauged and interpreted, and his enquiry was such as to confirm the multiple determination of failure in learning to read. This does not relieve the educators of their responsibility to try to offset adverse conditions, but the extent to which narrowly educational remedies can be ameliorative is limited.

A complete delineation of the educational state of affairs at a given time is possible only if we have available contemporaneous parallel surveys for several age-groups (or grade cohorts) from the school population. Swan's present estimate of the incidence of backwardness in reading, however, as being about 16 per cent, is similar to that found in several European countries. But neither that finding, nor the 8.5 per cent in Secondary schools, set off against nearly four times that number in the Vocational schools offers consolation to the education authorities or to the teachers—whether these latter be the teachers in the primary schools from which Swan's post-primary entrants have come, or the secondary teachers who baulk before the need to provide a last chance for these laggards. Swan has, indeed, exposed reading failure that is so serious, in Professor Wall's terms, that many pupils will "possess at school leaving barely sufficient or totally insufficient reading skills to enable them to maintain literacy and to go

(iii) on learning as adults". (Wall, W.D., *Constructive Education for Adolescents*, p.168).

Where reading failure exists, as Swan has shown, at entry to secondary education, it is doubtful whether even special help will significantly reduce the numbers of the handicapped or the severity of their condition. The condition for many will be aggravated by a process of attrition that is accelerated when schooling ceases. It certainly cannot be "cured" by action by the teachers alone, nor effectively remedied at all unless action is directed against the widespread psychological mal-or-mis-nutrition occurring at an early age.

I have described Professor Swan's new book as impressive. I had not intended to characterise it as a Jeremiad. I hope it will be widely read and digested, and that a desk-copy will be available to all psychologists working in the schools, to all who wield authority over any part of the educational system, and to all in the corridors of power who have a specific concern for the welfare and education of Ireland's children.

George Seth,
Emeritus Professor of Psychology,
The Queen's University of Belfast.

PART ONE: BACKGROUND TO THE SURVEY

The research presented here was the first national survey of reading standards in the post-primary schools of the Republic of Ireland. It was prompted by the need for some objective bench-mark of achievement in reading for these schools in general, at a time of unprecedented growth and change in Irish education.

Change in Irish schools

Following more than a full generation of relative tranquillity, the school system in the late 1960s experienced considerable upheavals. These were stimulated by new levels of both rural depopulation, urban growth and industrialization on the one hand, and by new levels of communication, self-awareness, and openness to educational ideas from abroad on the other.

In the primary (National) school sector probably the most far-reaching of several innovations was the inauguration of a new curriculum in 1969 to replace one that had dated from 1926. This marked a point of departure in which some time-honoured priorities were set aside whilst important innovations, both in subject-matter and in pedagogy, were urged upon the teachers by the Department of Education. In this new dispensation the teaching of English reading was to receive a worthier status, and a treatment that reflected current pedagogical practice elsewhere in the world. But change in educational theory does not become practice overnight, and the paucity of backup in-service courses here retarded somewhat the process of renewal.

It was however in the post-primary sector that the full brunt of change was felt. Traditionally this sector comprised two quite separate systems or streams, the privately owned Second-

2 ary (grammar type) schools enrolling about two-thirds of the pupils, and the publicly owned Vocational or Technical system enrolling about one-third. In theory, and to a large extent in practice, the former were non-selective; but since they did charge fees, however small in many cases, they did exclude some children by this means. The Vocational, on the other hand, being publicly owned and financed, have been non-fee-paying and non-selective since their establishment in 1930.

As late as 1963 however, 17,500 children or almost one-third of a yearly cohort were still dropping out of full-time education upon leaving primary school—and of these one-quarter did so without ever reaching the sixth standard. The implications of this for the literacy levels of those concerned must have been serious indeed, not to mention the implications for the economy and society as a whole. Clearly the *laissez-faire* policy of the State in regard to the Secondary schools could no longer be claimed, in the words of the Constitution, to cherish all the children of the nation equally.

Quite abruptly then in 1967 a dynamic Minister for Education, Donogh O'Malley, proclaimed his plan to make free post-primary schooling available to every child who sought it. A comprehensive school transport scheme was also set up, while by 1972 school attendance up to age 15 would become compulsory for all. Although these forward moves represented a vastly increased State investment in education, and required the co-operation of a large private sector, they were carried through almost totally without prior consultation with the school authorities in this sector. Nevertheless by 1972 the "drop-out" at the end of primary schooling had been reduced to below 5 per cent, while by the same year the enrolment in post-primary had increased by 70 per cent over its level of ten years previously, a trend that has indeed continued since then. In short the "O'Malley Plan" was resoundingly successful in increasing the retentiveness of the post-primary school system. But whether this was achieved at the cost of lowered academic

standards in these schools it was not possible to say in the absence of objective scientific norms of achievement dating from before the changes in question.

Woven through this drive to equalize access to educational opportunity was another motif—the problem of how to make the schools responsive to the varying needs of the different groups of pupils. One early answer was an attempt to erode the inherent duality of the post-primary system by persuading neighbouring Secondary and Vocational schools to amalgamate—thereby also sharing costly resources rather than duplicating. But a campaign of consultation and persuasion embarked upon to this end was not successful. Meanwhile the State was predictably being called upon to fund vast new building programmes for both Secondary and Vocational schools.

A further solution was for the State directly to establish a small number of Comprehensive schools—though these would initially be set up in either remote rural areas where no school existed, or in new surburban areas. They have in turn been superseded by the Community schools, with similar though broader objectives, and in some cases these do replace independent Secondary and Vocational schools in a neighbourhood.

Another response, this one in the area of curriculum, was to revise the courses in technical subjects so as to include them in the Secondary school curricula and examinations, and conversely to enable those Vocational school pupils who so wished, to follow an academic course in the traditionally Secondary subjects. And yet the imbalance in relative enrolments as between Secondary and Vocational had scarcely shifted at all between 1968-69 and 1971-72.

It must be emphasised however that no overall academic selection procedure for post-primary schooling has been operated here since 1966—perhaps in view of some difficulties experienced in relation to the 11+ test in neighbouring countries. The age of transfer here tends on the whole to be later than

4 that in the United Kingdom, whilst in theory the choice of school is left to the pupil or his parents. There are however some Secondary schools which, apparently in order to cope with excess of demand, do implement their own selection procedures; in 1974-75 these amounted to no more than 16 per cent in McCloskey's (1977) comprehensive survey of the Secondary schools. Whilst we appear then to have a post-primary sector which by and large is not explicitly selective, nevertheless certain factors could still operate, even through self-selection, which result in systematically different achievement levels as between the Secondary and the Vocational sectors.

Reading in the post-primary school

The stage of transition from primary to post-primary schooling is itself a critical one and may well cast a harsh light on the shortcomings of any school system. It is of course a point of instability in the personal development of many pupils as well, and not surprisingly some have been found to slow down temporarily at least at this stage, as they seek to gain a foothold in the new arena (Nisbet and Entwistle, 1969). No doubt a number never actually adjust to their new school at all, and these will drop out at the earliest opportunity. The rest will of course accommodate in varying ways to their new situation and go on to profit by it in most cases.

Reading standard can be a most sensitive barometer here, not least because it is regarded as being so important by adult society, has been central to all the pupil's schooling to date and is now the key to independent learning. Some studies (Ramsey, 1963; Artley, 1968; Nisbet and Entwistle, 1969) have indeed observed a slowing-down in pupils' reading growth at this stage, whether associated with a slower overall growth in mental development (Dearborn and Rothney, 1941), or with a kind of "decision to fail" (Schonell, 1942) in some cases. In the latter kind of case it seems as though the pupil who is

seriously lagging behind may see himself not just as an inferior reader but as an inferior person, so much is this skill bound up with the pupil's self-concept. He urgently needs to experience immediate success therefore if he is to continue to strive in this area at all. 5

Growth in reading, though not necessarily a smooth process, is a cumulative one which, once commenced, may continue indefinitely given favourable conditions. Consequently, the distinction sometimes drawn between learning to read and reading to learn is a rather artificial one. But it may serve to highlight the equally untenable, though widely held notion that the pupil has finished learning to read by the time he leaves the primary school.

There is a threefold difficulty here. First, any assumption that something like a uniform standard will have been achieved by all post-primary entrants, is not borne out either by empirical studies or by the experience of teachers. In one study the range of levels among seventh grade pupils was found to stretch from below grade four to above grade eleven—or in equivalent Irish terms say from below fourth class primary up to fifth year Secondary (Young, 1956). Sheldon (1956) indeed found them to range from second to eleventh grade, among the same cohort, while Foster (1955) reported that although over 21 per cent were reading below fifth grade level and 34 per cent below their own grade level, the best were better than the average senior pupil in high school. Of course it is no more to be expected that all pupils on leaving the primary school will have reached the same level of achievement in anything, than that all who start a race together will finish at the same time—though the analogy ends there. Yet it is well known that a considerable amount of frustration among post-primary teachers stems from being expected to teach thirty or so pupils as though all were in fact at the same level (Hunt and Sheldon, 1950), a problem that is becoming increasingly apparent in Irish schools.

6 The second difficulty derives from the notion that there are no further reading skills that at least the average or bright pupil needs to master, which could not have been achieved by this time. In fact, the contrary is true, as teachers of any subject at the Secondary and University levels can readily testify. Third, there is implicit here a confusion between what may be minimal mechanical skill in reading and mastery of the art. A world of effort and experience may separate the reading of the junior school pupil which is mainly visual decoding and word-recognition, on the one hand, from that of his father critically perusing a professional journal, a poem or even a gardening manual, on the other.

Thus whilst the primary school carries the major burden in imparting the basic reading skills, some authorities (eg. Artley, 1968) hold that the post-primary school also has specifiable responsibilities not just at the remedial, but also at the developmental and corrective levels for teaching pupils to read. The developmental teaching of reading will aim at extending the well-consolidated reading skills of the majority; in particular the higher-order skills of comprehension, inference, appreciation and evaluation may, given suitable conditions, go on developing not only throughout the years of formal education but far beyond. The early years of post-primary schooling are besides a crucial time for the crystallization of tastes, interests and habits in the pupil's reading (Gray and Munroe, 1929). Hence the need for an explicit, co-ordinated policy in every post-primary school for the teaching of reading at each appropriate level, to all pupils.

Some authorities identify a need for the corrective teaching of reading as the second level of the post-primary school's responsibility in this regard. This is more clearly related to teaching the mechanical sub-skills of reading and denotes timely intervention by the teacher in order to prevent a serious lag building up in these, in the case of any individual.

The remedial level of responsibility has of course become

more prominent in recent years, in Ireland as elsewhere, following the increased retentiveness of the school system. Where every child must remain longer at school those who would most likely have dropped out in the past due to reading difficulty must now be accepted as part of the total picture and given appropriate teaching. While no published estimate of the extent of the problem here exists, the fact of its existence has been clearly acknowledged by the Department of Education in making available several hundred qualified remedial teachers throughout the post-primary sector, since the beginning of this decade.

It is of course an aspect of education which at every level, needs to be treated sensitively. At the same time, prior to 1972, only indirect indications of its existence here could be obtained.

Awareness of Diminished Literacy.

The existence of reading problems in many other countries is so well documented, despite differences of definition, that it would be surprising if Ireland were to be an exception in this matter. Indeed correspondence undertaken by the author with the educational authorities in a dozen countries yielded negative responses in only two cases. In these two there is reason to believe that a lack of sufficiently sensitive measurement instruments rather than an absence of reading difficulty was the explanation.

Among the earliest official indicators of diminished levels of achievement in Ireland in recent decades was the evidence of non-promotion of 34.5 per cent of National School pupils given in the Lynch Report (1965, part III) which was interpreted as reflecting poorly on their overall progress. Hyland (1969) attributed early school-leaving to non-promotion and to the inappropriateness of much of the curriculum, while Rudd(1972) confirmed that a total of 70 per cent of early leavers were "below and very much below average for age". It would be

8 unreasonable not to regard standards in reading as a major factor here, although we have no way of directly relating attrition to reading difficulty.

The Department of Education in its *Notes for Teachers* (An Roinn Oideachais, 1968) recognised and deplored the weak reading skills of some senior pupils, whilst the new curriculum has recommended new and more flexible approaches in this whole area. Again, although the role of reading at the post-primary level was adverted to in the *Rules and Programme for Secondary Schools* (An Roinn Oideachais) published annually by the Department, there was up to 1972/73 at any rate, no hint of a deficit in this area among our pupils, despite the fact that this curriculum was by now being followed in Vocational as well as Secondary schools. Essentially the kind of reading programme envisaged here would best be described as developmental with the higher and lower-level reading skills receiving implicit rather than explicit direction. And yet, as we have already noted, a corps of skilled remedial teachers were by this time being trained and employed in the post-primary schools.

Empirical research on reading in Irish schools prior to 1971 had been almost exclusively confined to the primary sector. Macnamara (1966) in a controversial, experimental-type study, claimed to establish causally why, on his finding, a sample of Irish National School pupils (but not of those 10.6 per cent attending private primary schools) were seriously inferior to their English counterparts, in achievement in English as measured by *Moray House Test 14*. Using samples limited to Dublin and Sligo National Schools respectively, both Kelly and McGee (1967) and O Baoillain (1972) supported his finding of a deficit in reading. The present writer (Swan, 1975) agrees with Brimer (1973) however in arguing that it is fallacious to assume that cross-national research, at least of this kind, could ever say whether one country is superior to another in such matters as reading achievement.

More helpful indeed are the follow-up studies carried out by

McDonagh (1973) and Travers (1977—reported by McGee 1977), in that they illustrate the trend of average standards five and ten years later, of a ten-to-eleven-year-old Dublin cohort which was first surveyed by Kelly and McGee. In all essentials the three studies were identical, and while no significant difference emerged between 1964 and 1969, the following five-year period showed a substantial improvement—with the proportion of weak readers reduced by half and that of all able readers approximately doubled. This is a most encouraging finding although obviously confined to the Dublin area and not generalizable to all the primary schools in the city.

The only other large-scale studies of reading achievement—both at the post-primary level—are those of Greaney (1973) and Greaney and Kelly (1977). As both of these were published subsequent to the present work being undertaken, they will be referred to at appropriate points below.

Meanwhile scattered evidence had been accumulating as indicating a reading problem. The National Adult Education Survey's final report *Adult Education in Ireland* (Murphy, 1973) concluded that many adults were being seriously impeded in their jobs by low levels of literacy. No estimate of the prevalence of the problem was attempted however.

Concern about the situation in the schools was expressed in the *Interim Report of the Committee on the Form and Function of the Intermediate Certificate Examination* (An Roinn Oideachais, 1973,) where reference was made to a (large) group of students "who are so educationally retarded at entrance to post-primary that they require a different form of schooling to the traditional one". Later still in the *Report of the Planning Committee to the Minister for Education on the Establishment of An Chomhairle Mhuinteoireachta* (An Roinn Oideachais, 1974) a similar apprehension was expressed. Again it is unthinkable that level of literacy was not in question here but once again no precise estimate of the incidence of reading difficulty was made.

Pilot Study

In view of the foregoing an initial pilot study of the views of school principals was undertaken in an *ad hoc* sample of schools in the school year 1971-72. This sample comprised 37 Secondary and 10 Vocational schools in the Dublin area, and two main questions were addressed to heads of each of these schools. Table 1 shows the questions and analyses the responses.

TABLE 1

Responses of School Principals

	Yes	No	School Type
"Is there a problem of reading backwardness in first year pupils?"	25	12	Sec.
	10	0	Voc.
	35	12	
"Is it the business of the post-primary school to deal with it?"	18	17	Sec.
	9	1	Voc.
	27	18	
No reply:		2	

Of all those queried therefore, 74.5 per cent said there was such a problem, 20 per cent adding "very definitely", and 11 per cent "slight"; a positive reply was given by 71.4 per cent of the Secondary and by 100 per cent of the Vocational Principals.

Those who were not aware of such a problem were heads of boys' and girls' Secondary schools in about equal numbers, whilst all of them described the home background of their pupils as being mostly either "Professional" or "Middle class". On the other hand, of all who described even some of their

pupils as being "Working class" 92 per cent felt there *was* a reading problem, one-third being most emphatic, while a quarter found it slight.

The responses to the second question showed that an overall 57.5 per cent of the respondents felt that it *was* the business of the post-primary school to deal with it. More specifically, 51.4 per cent of all the Secondary felt that it was their business, although 83 per cent of the heads of Secondary girls' schools thought it was, while 83 per cent of the heads of Secondary boys' schools felt it was *not* up to them. On the other hand 90 per cent of the Vocational heads felt that it was their business.

Finally of those who perceived that such a problem did exist, 38 per cent said they were tackling it reluctantly, 16 per cent felt inadequately staffed or equipped to do so, while 30 per cent of those who felt it was not their business to deal with it said that, given more favourable conditions, the problem should not arise. Indeed 47 per cent of all who answered both of the main questions in the affirmative, were tackling the problem despite misgivings about their ability to cope with it.

In short many of these principals were aware of the existence of a reading problem among their first-year pupils, though there were varied views as to what should be done about it.

PART TWO: THE RESEARCH PROCEDURE

The present study had two broad dimensions—the demographic and the individual. Its chief aims were the following:-

1. To establish norms in terms of reading test scores for the first year cohort of pupils in the post-primary schools throughout the Republic of Ireland in 1971-1972. These norms could then serve as the base-lines whereby any later change in standards might be determined.
2. To relate reading standard to reasoning ability, to the sex, age and motivation of the pupil, and to some aspects of his home environment.
3. To investigate the relationships existing in this population between reading standards and school type as well as other aspects of schooling.
4. Applying a conventional criterion of backwardness in reading, to pinpoint this problem in the pupil cohort in question, in terms of several characteristics related to reading.

These aims would be achieved by using appropriate instruments to sample the pupils' reading and related behaviour on the one hand, and by an adequate sampling of the pupil population on the other.

Sampling the pupils' reading achievement

A survey such as this requires a standardized test of reading to provide a scientific sampling of the behaviour of pupils under controlled conditions. Thus, by applying identical criteria of performance in reading to all the pupils concerned, under known conditions of validity and reliability, it will be possible to generalize from the sub-set of behaviour sampled in the test

to the theoretical universe of all such behaviour in these pupils.

Again by assigning a numerical value to a thirteen-year-old pupil's reading test performance for instance, we are purporting to sum up in a meaningful way on the basis of perhaps twenty minutes' sampling, his accumulated learning from six or more years' effort, in a potentially vast area of experience such as reading.

The quality of our test as a sampling instrument must therefore be high, whilst our interpretation of its findings must be tempered by the knowledge that there are potentially as many ways of being "average", "backward" or "advanced", even by the best criteria, as there are individuals whose test scores fall within such categories, and that any given pupil has, so to speak, only one way of being so on one testing.

The choice of reading test

The test of reading achievement used in this research was the *National Survey Form Six* (N.F.E.R., 1954) usually referred to as N.S.6. It was selected as being the most appropriate test then available, having been found through pilot studies (See Appendix I) to be acceptable for use with the target population of Irish pupils. It lent itself to efficient administration and scoring for large numbers, and, being reserved for research purposes, it would be equally unfamiliar to all the population in question. It had been shown to have no consistent sex bias (Start and Wells,1972) whilst its range of difficulty levels was found sufficiently wide to span the anticipated range in the total national cohort of pupils. The obvious dangers inherent in both the borrowing of a test from a different culture on the one hand, and the ageing to which this one might be subject on the other, warranted a detailed study of its validity and reliability for Irish children. As Appendix I shows, these were found sufficiently high to justify its use.

14 A group test of silent reading comprehension, it comprises 60 sentences, each with one word missing. The pupil is requested to pick, from among five given in brackets after the sentence, the one word which will make it 'sensible', and to indicate his choice by underlining the word chosen as being correct. The test is printed on either side of a double page, and 20 minutes are allowed for completion.

It is scored by allocating one point to each correct response throughout, or up to the point where seven consecutive wrong answers occur, if this should happen. Any correct answers beyond this point are assumed to be due to chance and are ignored. This correction device for chance scoring was felt to be useful in a test of this kind where the merely haphazard underlining of words not understood, is a temptation to the weaker pupil who could thereby gain undeserved points. A similar correction for undeserved chance points which applied to the *Sentence Reading Test 1* (Watts, 1956) was found to yield correlations of .98 or .99 between "corrected" and "uncorrected" scores, whilst a study of the test re-test results showed that the correction had no effect on reliability (Wiseman, 1959).

The test of reasoning

The pupils' reasoning ability was investigated by means of Birkbeck Test 1 (Cavanagh. 1960). This is an English revision carried out by Cavanagh of the Abstraction sub-test of the *Shipley-Hartford Retreat Scale* (Shipley, 1940b) the other sub-test of which measured Vocabulary. It was assumed by the authors in both cases that each represented a separate aspect of intellectual functioning, with different rates of growth and decline. This seems also to be the general rationale underlying Cattell's theory of fluid and crystallized intelligence which in turn provided the theoretical framework for the present study (Cattell,1971; Horn and Cattell, 1967; Horn, 1968).

Birkbeck 1 is one of a number of revisions which were made of the *Shipley Abstraction Scale* mainly by British army and navy psychologists during World War 11 (Cavanagh,1972), and later described by Vernon and Parry (1949, p.221) as comprising "the most important developments made in group testing techniques in Britain during the war" while providing "a perfect illustration of Spearman's eduction of relations and correlates". Again Vernon (1972a) used a revision of the original Abstraction scale which is very similar to Birkbeck 1, in his wide-ranging cross-cultural studies.

Birkbeck Test 1, besides forming part of a battery of five tests, may be used alone for certain purposes. It is a scale comprising twenty-five items, and covering a varied range of problem content whose common element is inductive reasoning. Only six of the items depend wholly or partly on the comprehension of *words* read, all of which are at a simple level. It was considered particularly appropriate for the present research since one aim here was to attempt to control as far as possible for intelligence by using a test which would avoid the disadvantages of verbally loaded tests for the weaker reader, while at the same time not being as unrelated to scholastic aptitude as the pictorial or diagrammatic types of test seem to be. It was seen, therefore, as a useful exemplar of Cattell's fluid intelligence area, counterbalancing the N.S.6 as sampling crystallized intelligence, in Cattell's terms.

Birkbeck 1 also met the present need for a short group test. All the items are printed on one side of the test paper. One sample item is given first—perhaps inadequate for very dull subjects—and the single administrative instruction is both read beforehand and visible to the subject throughout the test. From preliminary trial runs it was felt more appropriate to extend the testing time to fifteen (from the usual ten) minutes, both in view of the very high ceiling of the test, and the relative lack of test experience among Irish pupils.

Two points of raw score are awarded for each item correctly

16 answered. The total novelty of the test was ensured by asking each group whether they had done this test before, and the one sample school where this was so, was eliminated.

Seven studies of the validity of the test and three of its reliability were carried out (cf. Swan 1974b). Correlation co-efficients of .77 with the *Drumcondra Test of Verbal Reasoning* (Gorman, 1968) and of .82 to .87 with the *California Short Form Test of Mental Maturity* (Sullivan *et al.*, 1963) gave indications of its construct and concurrent validity. It was found to correlate more closely with tests that were both verbal and non-verbal, than with either kind alone. It also discriminated well among subjects from primary school up to final year University student level. Its co-efficient of stability was r =.94, with a Kuder-Richardson co-efficient of inter-item consistency of r =.82.

The pupil questionnaire

In order to incorporate a limited explanatory dimension into the study by investigating some further correlates of reading achievement, a carefully designed questionnaire for group administration was the most ambitious instrument that survey time would permit. The questionnaire comprised three typed pages with 13 items in all, ranging from single questions to multiple-choice check-lists. Its content arose both from the findings of previous research and a perusal of several hundred pupils' essays on aspects of reading, written through the good offices of a large number of teachers, by their own pupils. These were followed by face-to-face discussions between the writer and first-year pupils in schools of several kinds, in order to focus more clearly on their interaction with reading under many aspects.

The data sought in the questionnaire fell into four categories —personal, motivational, scholastic and familial, with varying numbers of items, and a far from complete coverage of all.

Table 2 shows the topics and areas investigated.

TABLE 2

Data sought by means of Questionnaire

Personal	Motivational	Scholastic	Familial
Name	Frequency of reading	Type and name of primary school	Size of family
Sex	Tastes and interests in reading	No. of previous schools	Socio-economic status
Age (in years and months)	Self-reported attitude to reading	Respondent's level of scholastic aspiration	Cultural level of the home
			Parents' scholastic aspiration for him

Systematic pilot trial, improvement or deletion, and re-trial led to the questionnaire format eventually used (See Appendix II).

The questions began with factual queries as to the informant's name, age, family size, occupational status of parent, and scholastic history to date. Queries concerning opinions, interests and habits related to reading followed, intentionally sequenced so as to reduce response set. The questionnaire concluded with an attitude-to-reading scale of the Likert type.

More than one question or item relating to a given focus of enquiry was used where pilot studies indicated that one was insufficient, or as a cross-check on each other, or where a forced-choice format needed to be complemented by an open-ended one. It was felt necessary to use both strategies in some

18 cases in view of the well-known discrepancies between manifest and latent mental content.

As it was completed by the pupil in the presence of a research assistant oral queries were encouraged and responses checked there and then to eliminate ambiguities and clarify meanings. The confidentiality of the material was guaranteed and the importance of veracity stressed.

Sampling the Pupil Population

It was decided to focus on a grade rather than an age cohort, for two reasons. First, because pupils are grouped in schools by grade rather than age, and are likely to be perceived primarily by their teachers as belonging to a particular grade, whatever their age, both in determining expected standards and in devising curricula; for this reason the statement of survey findings in terms of grade norms is liable to be more immediately meaningful. Second, while both age and grade norms become less than satisfactory in a school system such as ours where the spread of ages per grade is very wide, nevertheless the consensus of opinion, according to Flanagan (1963) favours grade norms up to the level in question here.

Given the decision to focus on a grade cohort, and that this should be first year, the need to sample was obvious. But prior to sampling was the need to refine our definition of the population so as to examine its accessibility for this purpose.

Initially these were defined as all the pupils in first year classes in post-primary schools throughout the Republic in the school year 1971-72. Excluded by definition therefore were all terminal leavers from primary schools as well as pupils of similar age who might not yet have transferred or who might be in special schools of any kind; the number of all ages who transferred to such schools in the previous year was 273,

according to information supplied by the Department of Education. Besides, since the statutory school-leaving age at the time of testing was still 14—it was raised on 1 July, 1972—some of those who had already reached 14 in the post-primary school might have left before this fieldwork was done and no national data was available on them. Those discontinuing full-time schooling in that year, from the primary school, were subsequently estimated from departmental information at 4.5 to 5 per cent of a grade cohort.

Now while the total number given as leaving National Schools to transfer to post-primary in 1970-71 was 54,181, the actual number of new entrants enrolled in post-primary for 1971-72 was 58,129. The excess here seems to have comprised mainly those from private primary schools who were subsequently estimated by Department officials at about 3,300. The balance of the discrepancy may have attended primary schools abroad; no complete estimate of the number of such pupils could be made however.

Indeed the concept of first year itself proved occasionally less than clear-cut, as there are a few Secondary schools which admit pupils who have just completed fifth standard primary and who then move into a preparatory year in Secondary. Probably most of these will be schools whose primary department is not a National School. In other cases however, the pupil will spend the *first* Secondary year in so-called "second year" classes! In all such cases the criterion for inclusion in our sample was that the pupils should be in the first year of their Intermediate Certificate course, or their Continuation Course in the case of Vocational schools, and be in full-time attendance.

Even applying this criterion however, it was found that a small number of eleven-year-olds were included, although they would not yet qualify as "recognised" post-primary pupils in official terminology. They were retrospectively estimated to number 1,820 as of 1 January 1972, or .0313 of the full cohort.

20 The dilemma presented by their existence could have been solved either by excluding them from the sample (since they were necessarily excluded from the sampling frame) while attenuating further our population as defined, or accepting a slight mis-match between the sampling frame and the actual population sampled. The latter alternative was chosen, and it would have to be assumed that, with sufficiently numerous and representative sampling of the population, their representation within the sample would reflect their occurrence in the population as a whole, since no concurrent statistics could be obtained on them. In fact they numbered 69 in our sample or .0204 of the total, five of them in Vocational and the rest in Secondary classes. It has already been noted above that Vocational pupils tend to be somewhat older, transferring on average six months of age later than their Secondary counterparts, and that although there is no formal regional or national mechanism of selection, some individual schools would seem to implement one.

Selecting the sample : first stage

It was intended that the sample of pupils to be tested should be a probability sample (Cochran, 1963) representative of the designated population, given the conditions already stated. This would be ensured by detailed stratification, by testing adequate numbers, and by equalizing the probability of selection. The sample itself would be drawn in two stages, first the selection of schools and second the selection of pupils within these, adhering as far as possible to the strata existing in the population, so as to enhance precision (cf Stuart, 1964; Moser, 1969).

Sampling by this procedure consists of identifying those sub-groups that comprise the population, and treating each as a separate unit to be represented in the sample in the same proportion as it contributes to the full population. Ideally these sub-groups would be those within which the dependent variable is thought to be most homogeneous, and between which its

variance may be most heterogeneous.

In the light of the limited knowledge available, it was decided to stratify the population on the bases of type of school, geographical location, sex of pupils, and denomination of management in the case of the Secondary. Each of these categories was a pre-existing classification of the schools, which could perhaps provide useful comparative data in terms of reading standards. This yielded the stratification categories shown in Appendix III.

In the stratification by region, following the usage of the Department of Education in order to facilitate extraction of the required data, "Other Cities" referred only to Cork, Limerick and Waterford, while "Dublin" corresponded to the urban limits of some decades ago, both matters that would be borne in mind at the data analysis stage.

Both sex of pupils and denominational status were varying characteristics of schools at all levels in Ireland, with a strong prevalence of single-sex Secondary schools in most areas still, as well as denominational boundaries that were rather rarely crossed in a pupil's career. "Other Religion" was used here in the sense of other than Roman Catholic. Denominational status does not apply in the Vocational sector; it has however been found to be related to school achievement in Ireland (Lynch, 1965; Geary and Ó Muircheartaigh, 1974).

Community schools as such had not begun to function in the year 1971-72, while the Comprehensive (as defined by the Department of Education) and the Secondary Top sectors were so organised as not to admit of refined cross-stratification, and were sampled judgmentally on the basis of region and sex of pupils only. Including each of the last two as separate strata then, the population was distributed among 24 strata each of which it was proposed to sample individually.

Selecting the sample : second stage

The sampling procedure adumbrated is of course a two-stage

22 cluster sampling i.e. taking advantage of the existing grouping of second-stage units (pupils) into first-stage units (schools). While this procedure will be less precise than direct sampling of the individuals themselves, perhaps negativing the gain from stratification, it was nevertheless felt necessary in order to concentrate the fieldwork within reasonable limits, and has come to be regarded as standard practice in large-scale educational surveys (cf. Peaker, 1967; Start and Wells, 1972, *et al.*). A related question here is whether one is testing a characteristic of pupils or of schools, and while it can be argued that the ulitmate focus is on the pupil, nevertheless various factors may serve to group pupils of similar reading levels into relatively homogeneous school units, even at post-primary level, such that the two are to some extent interrelated. Thus it is the fact that the pupil selections are not independent of each other, that is associated with the loss of precision in this approach.

Obviously where two stages are entailed in sampling, each stage will contribute to the variance of the mean, first the variance of the cluster means around the total sample mean, and second the variance of the individual scores around the mean of each cluster. But there are many ways of distributing a sample over even two sampling stages and in the choice among them, both practical feasibility and the effect on sampling errors must be weighed.

The efficiency of cluster sampling depends on the number and size of the clusters used. Some satisfactory intermediate design must however be found between the danger of bias arising from the use of a lot of pupils in a few schools on the one hand, and the undue demands of a few pupils in each of too many schools on the other.

Now uniformity is a noted feature of Irish post-primary schools (cf. Atkinson, 1969) despite the fact of private ownership of most of them. There is a multiplicity of smaller schools—only 2.5 per cent of them enrolled over 200 first-year pupils in 1971-72—frequently segregated by sex, as we have

seen, and duplicating rather than complementing each other's curricula, both in provincial and urban areas. There is also some homogeneity in the socio-economic background of pupils within each of the Secondary and Vocational sectors, further supported by a relatively small regard for the "neighbourhood school" concept at least in the Dublin area, as both Swan (1968) and Rudd (1972) have shown, many pupils passing by half a dozen schools en route to their own each day.

These peculiarities of the target population, as well as the risk of bias inherent in cluster sampling were taken as indicating a need to spread the net of school catchment as widely as resources would permit, while testing fewer pupils per school. This principle would in turn tend to offset the loss of precision associated with cluster sampling already noted.

The sampling model which seemed best suited to meet these requirements was that developed by Hansen and Hurwitz (1943), and described by Moser (1969) and Cochran (1963). It entails the selection of first-stage units (schools) with probability proportionate to their sizes, while testing the same number of second-stage units (pupils) in each selected school, thus leading to a fixed overall rate with different combinations of first and second-stage selection rates (Kish, 1965). It seemed quite a convenient method of planning fieldwork and, since it equalises the probability of selection, it is in theory self-weighting. Thus the greater probability of selection of the larger unit, at the first stage, is counterbalanced by the correspondingly smaller probability of selection of the individual within it at the second stage, provided that each population element belongs to one and only one unit, and that the population has been partitioned into a defined set of units without overlap or gap, as was done in this case. The underlying principle involved here is illustrated hypothetically in Table 3 (See next page).

In estimating a desirable size of sample, two basic principles were accepted. First, that the sample should be as large as resources would permit, since, other things being equal, the

TABLE 3

Illustration of Sampling with Probability Proportionate to Size

School	Population	Relative probability at stage 1 (p1)	Size of sample selected in each school	Probability at stage 2 (p2)	Overall probability of selection (p1 x p2)
A	200	2	20	20/200 = 1/10	2 x 1/10 = 1/5
B	100	1	20	20/100 = 1/5	1 x 1/5 = 1/5

bigger the sample, the more accurate any estimate. Second, that it should be detailed enough to overcome undue school bias within the smallest strata, except where there was only one school in the corresponding population. These principles were given priority over the need to maintain the pre-determined stratum proportions both of pupils and of schools, as disproportionate stratification can be overcome by later weighting and is recommended where strict proportionality would render groups too small for adequate analysis. Here again cost per unit enters in, and, since this would be lower in urban than in rural areas, a slightly greater coverage of schools in the urban areas was planned.

Overall sampling fractions of about one in twenty of the pupil population in one-fifth of the schools were decided upon as minimal desirable guidelines to meet the above criteria. Based on the population size (N = 55,644) and composition of the previous year (see Appendix III), the required numbers of pupils per stratum and per school were estimated. It became clear that in the very smallest schools it might not be possible to adhere to the fixed number of pupils desired, but this could not always be discovered in advance and had to be tolerated.

Cumulative totals of pupil enrolment, school by school, in each stratum were then made, and each school was assigned a number. A number of schools proportionate to the number in the stratum, would provide the equal pupils-per-school number required, although pupil proportions per stratum were given precedence. Random numbers were then drawn to the number of schools decided upon, between one and the number of pupils in the stratum. The assigned number of the school to which each pupil so drawn belonged, was noted; it was these schools which provided the pupils to be tested. 25

The research fieldwork

In order to achieve the maximum participation in the survey, every precaution was taken to explain the aims and procedures involved to school authorities. The goodwill of the Minister for Education, of the Vocational Education Committees, of the relevant Religious and Lay School authorities, and of the other professional associations of teachers was readily forthcoming. An enthusiastic response was also received from the individual school principals, many of whom were already conscious of a reading problem of serious dimensions among their pupils.

The decision not to place the extra burden of sample selection and test administration on the teachers themselves, though a costly one in some respects, may have helped here. It was motivated mainly by the need to maintain as much uniformity as possible in the conditions of testing, and to prevent not only unconscious bias in test administration, but also the possibly distorting effect of the teacher-pupil relationship on response. Testing was carried out by a trained team of qualified psychologists and students of educational psychology from the Department of Psychology at University College, Dublin, in the months of March to May, 1972. The research workers selected the pupils to be tested in each school, beginning with a random start, from the enrolment lists supplied by the principal. As a second visit to each school was not feasible,

26 any absentees had to be ignored.

The later arduous tasks of scoring and entering the data, as well as the further stage of checking the data for the full sample, were carried out by, or under the direct supervision of the same team. This aspect of the research was completed with the transfer of the data to school data analysis sheets and from these in turn to I.B.M. punching instruction sheets. The full data was then transferred to punched cards and eventually recorded on disc for immediate access through the computer.

The achieved sample

The fieldwork programme was carried out in 161 of the proposed 166 schools in the sample, amounting to a participation rate of 96.98 per cent. The loss was attributable to the following factors, viz. one school's failure to reply even to a second approach, faulty scheduling on the part of a second principal, one refusal on the ground that the school was about to amalgamate with another already tested and a further refusal on grounds not stated. In the remaining school it was discovered after testing that the pupils were already familiar with one test used. While one can but speculate on whether such losses might have differed systematically from the rest, their volume was slight and the rate of participation achieved was considered a satisfactory one.

The achieved sample of schools comprised 18.8 per cent of all the post-primary schools in the country. They were located in all four provinces and in eighteen of the twenty-six counties. Table 4 shows their distribution throughout the strata and compares the proposed and achieved numbers. Appendix IV gives the number of schools in the population, while Table 4 compares the sample achieved with that proposed.

Each district and type of school proposed was represented therefore in the sample, despite the loss of three schools in Dublin and two elsewhere.

The achieved sample of pupils numbered 3,377 or 5.96 per

TABLE 4

Proposed and Achieved Samples of Schools

Secondary						
	Dublin		Other Cities		Rest of Ireland	
	Proposed	Achieved	Proposed	Achieved	Proposed	Achieved
Boys' Cath.	13	12	6	6	24	22
Boys' Other R.	2	1	0	0	0	0
Girls' Cath.	17	16	7	7	26	26
Girls' Other R.	2	2	1	1	0	0
Mixed Cath.	2	2	1	1	7	7
Mixed Other R.	3	3	2	2	2	2

Vocational						
	Dublin		Other Cities		Rest of Ireland	
	Proposed	Achieved	Proposed	Achieved	Proposed	Achieved
Boys'	10	10	2	2	2	2
Girls'	2	2	0	0	2	2
Mixed	0	0	2	2	26	26

Secondary Top		Comprehensive	
Proposed	Achieved	Proposed	Achieved
3	3	2	2

cent of the current year's population, (6.22 per cent of the previous year's). The fact that it exceeded the sampling fraction proposed arose mainly from the desire to anticipate an ensuing growth in pupil numbers and such uncontrollable

28 contingencies as the non-participation of schools. In one area particularly, correspondence suggested that an unexplained reversal of declared policy might well exclude some or all of the schools in question from our sample, which would have been disastrous. Thus it was decided to accept more pupils within each selected school in question as one went along, so that at least the stratum quota of pupils might be reached even if these had to be in a truncated sample of schools. This of course unavoidably led to some inequality in the numbers per school tested, while the need to maintain a balanced sample (i.e. equal representation of all "streams" within a given school), as well as the occasional school which enrolled too few pupils—all required at times a departure from the equal number of pupils per school. Indeed in the problem area in question, time-consuming personal approaches prevailed, yielding full school participation here, with both the quota and the number of pupils well exceeded in this area. Thus while the mean number of pupils per school ($m = 20.99$) in the achieved sample slightly exceeded that proposed, their standard deviation at 6.6 was unavoidably high.

Such discrepancies between proposed and achieved samples could have introduced some possible bias in the pupil selection but this would be righted later, by weighting estimates from the sample by the actual population proportions. *Post factum* weighting was unavoidable anyhow, in order to base norms on the current year's population proportions, rather than those of the previous year, as significant changes ($P < .001$) in the proportional composition of both the Secondary and Vocational populations were subsequently found to have occurred since 1970-71.

Tables 5, 6 and 7 below (as well as Appendix III) give further indications of the composition of the achieved sample, relative to its parent population, the latter data based on current statistics supplied by the Department of Education's Statistics Section.

TABLE 5

Schools in population (1971–72) and sample proportion of each type

	Secondary	Vocational	Sec. Top	Comprehensive	Total
Proportion of Population	.6735	.2957	.0193	.0114	.9999
Proportion of Sample	.6832	.2857	.0186	.0124	.9999

TABLE 6

Sex distributions in population (1971–72) and sample

	Boys	Girls	Total
In Population	.5097	.4903	1.0000
In Sample	.5087	.4913	1.0000

It will be seen from these tables that the proportional composition of the achieved sample reflected closely the composition of the population, despite the lack of up-to-date information on the latter, and the vicissitudes of the field-work.

Appendix III shows the achieved pupil numbers as proportions of the corresponding 1971-72 population in each of the 24 strata. It will be seen that in the smaller strata generally higher proportions were achieved; indeed in strata 09 and 10 it was thought best to include very high proportions of the pupils as these were both single-school strata, with quite small enrolments. Slight shortfalls, on the other hand, were

TABLE 7

Pupil sample: columns show relative proportions of boys and girls by school type and region (a) in population (b) in sample

	Dublin		Other Cities		Rest of Ireland	
	Secondary					
	Population	Sample	Population	Sample	Population	Sample
Boys	.4447	.4466	.4542	.4414	.4297	.4436
Girls	.5553	.5534	.5458	.5586	.5703	.5564
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	Vocational					
	Population	Sample	Population	Sample	Population	Sample
Boys	.7372	.9018	.8037	.7273	.6365	.5806
Girls	.2628	.0982	.1963	.2727	.3635	.4194
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

	Secondary Top		Comprehensive	
	Population	Sample	Population	Sample
Boys	.1388	.1091	.5897	.5224
Girls	.8612	.8909	.4103	.4776
	1.0000	1.0000	1.0000	1.0000

experienced in two of the larger strata, 16 and 25, both widely scattered and again with many small schools, despite overall stratum increases in enrolment over 1970-71. A problem of small enrolment also occurred in stratum 19, causing a shortfall of two pupils from the proposed quota, though this would still have been a low proportion due to the considerable increase in population over the previous year. 31

PART THREE: THE SURVEY FINDINGS

The primary aim of this research was to establish reading norms[1] for the first-year pupil cohort of 1971–72, in terms of N.S.6

TABLE 8
N.S.6 Test Scores: Sample Percentiles and Means; Population Means for all Pupils, and for Boys and Girls

Percentile Rank	All Pupils (n = 3,377)	Boys (n = 1,719)	Girls (n = 1,658)	Boy – Girl Score Diff.
90	51.75	51.45	49.77	1.68
80	46.49	46.34	45.11	1.23
70	42.93	42.80	41.76	1.04
60	39.50	39.42	38.69	0.73
50	36.37	36.28	35.88	0.40
40	33.56	33.16	33.78	- 0.62
30	31.12	29.57	29.69	- 0.12
20	27.03	24.65	26.27	- 1.62
10	20.93	18.94	21.02	- 2.08
Sample Mean	35.32	35.05	35.60	Mean diff. = 0.55 (NS)
S.D.	11.36	12.00	10.65	Diff. between S.D.'s = 1.35**
Population Mean	34.97	34.78	35.17	Mean diff. = 0.39(NS)
$SE_{\bar{M}}$	0.37	0.40	0.40	

N.S. = not significant **P < 0.01

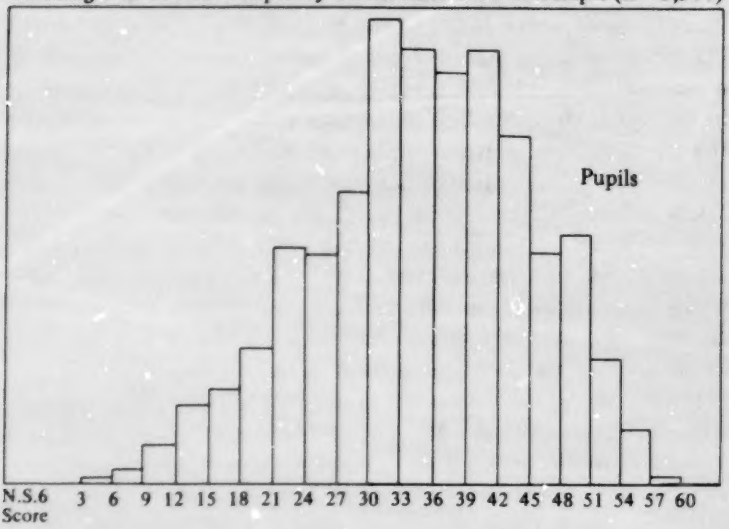
1. The weighting fractions applied to each of the stratum means in estimating the overall population means, are shown in Appendix V, while Appendix VI gives the stratum and sex-within-stratum contributions to these. The data contributing to the estimate of the error variance of the total population mean N.S.6 score will be found in Appendix VII. Again the weights applied in estimating the population mean N.S.6 score for each sex are shown in Appendix V while the computation of the error variance of these means will be found in Appendix VIII.

raw scores. These are given in Table 8 as estimates both for the total population and for its main sub-divisions.

The mean population score on the N.S.6 test was 34.97 ($SE_{\bar{M}}$ 0.37), as Table 8 shows.[1] This table also gives the decile points of the raw scores obtained on the full sample, as well as those for each sex, and the difference between the sexes at each point.

The distribution of reading test scores for the full sample (see Figure 1), while departing from the normal to some extent (the co-efficients of both skewness and kurtosis were significant at the .01 level), was nevertheless fairly symmetrical and unimodal. The curve was platykurtic, with a negative skew, and undue plateau effects at some points. Apart from this the test scores were spread well across the entire scale, indicating the suitability of the test to the level and range of this population.

Figure 1
Reading Test Scores: Frequency Distribution for Full Sample (n = 3,377)



34 Perhaps the most striking of the survey findings is the wide diversity of reading standards among first-year pupils in post-primary schools. Towards the upper end of the scale a good minority of them showed reading skills at least equivalent to those of the average adult. Towards the lower end of the scale a considerable "tail" of pupils emerged, who had likewise reached their first year of post-primary schooling but with little or no independent reading skill. This phenomenon is discussed in more detail below.

Sex differences in reading achievement

The fact that the mean reading scores of the boys and of the girls did not differ significantly, is also interesting, especially on a national sample such as this and with a test that was shown elsewhere to be without a sex bias. It is important to note that their mean ages did not differ significantly either. Their actual means were 162.75 ($SE_{\bar{M}}$ 0.32) and 162.2 ($SE_{\bar{M}}$ 0.6) months respectively (see Appendix IX), a discrepancy of no more than 17 days, which failed to reach the 0.05 level of significance. The absence of an age difference facilitates the generalization of comparisons observed between the sexes, though it must be stressed that similarities between the sexes loom larger than differences in the overall picture. From estimates based on the full sample then, since the mean reading scores of the sexes did not differ significantly, sex membership was found not to have a significant overall effect on mean reading achievement in this cohort. With grade held constant and mean age identical as between the sexes, it would seem as though the boys, on average, have now caught up with the girls in reading, if we can assume that at the younger ages, on the evidence of most previous research (cf. Swan, 1977b), the girls were probably ahead. At any rate the greater physiological maturity which, on the basis of other research, we can presume to have been reached by the girls, does not seem to have been matched by a correspondingly higher level of achievement

in reading here.

This is all the more interesting since it also emerged here that reasoning ability (Birkbeck 1 score) showed a significantly higher correlation with reading score in the girls than in the boys. In the context of Cattell's theory of fluid and crystallized intelligence, this would indicate that the girls were intellectually more mature than the boys. Besides, their responses to the questionnaire here showed that they read more frequently and generally held more favourable attitudes to reading than the boys. Are the schools then unable to exploit all these more favourable characteristics of the girls, in order to help them even maintain the average lead which they probably have held up to this age? Since two-thirds of Irish pupils may still attend single-sex schools, the school system here offers a unique opportunity to study sex differences in reading. But whereas in this situation we might expect that such differences would become accentuated, in fact they were now found to have disappeared.

The spread of scores for the sexes did however show a significant difference, as comparison of their standard deviations and of their percentile points shows. The sex differences in percentile points fan out so to speak from the centre, with the boys showing a wider spread of scores overall i.e. both leading the girls at the top of the scale, and below them at the bottom. The differences will be seen graphically in Figure 2 (page 36) which shows the smoothed frequency curves of both.

This phenomenon has also been found in other studies including those of Start and Wells (1972) and of Wilson (1973 and 1977), where the scores for both sexes likewise converge towards the mean but fan out in such a way that more of the boys lie above and below one standard deviation from the mean, i.e. more boys than girls are both backward and advanced readers. Table 9 shows the relative proportions of pupils in question, with the excess of boys over girls almost twice as great at the backward level.

Figure 2
N.S.6 Scores: Smoothed Frequency Distributions of Boys and Girls

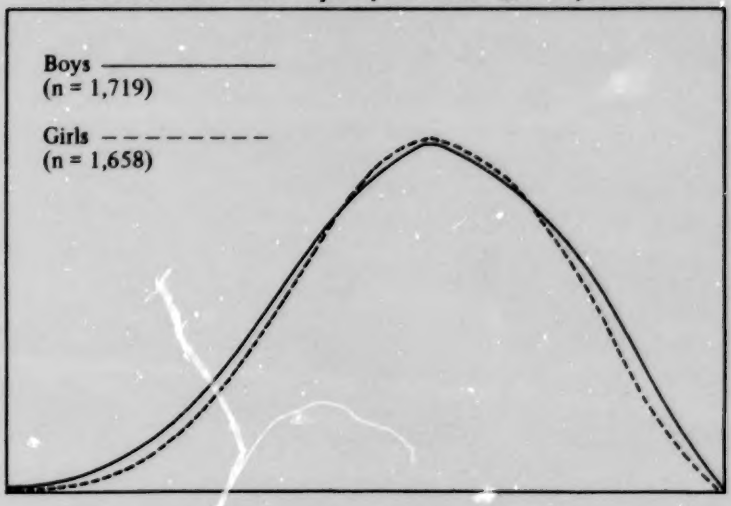


TABLE 9
Proportions of boys and girls Backward and Advanced Readers

	Boys (n = 1,719)	Girls (n = 1,658)	Difference
% Backward	18.38	13.38	5.00 **
% Advanced	18.49	15.92	2.57 **
** $P < 0.01$			

This is a feature that has been noted on tests of other areas of cognitive functioning as well as reading (cf. Swan, 1977b).

The sex difference patterns found here bear further interesting comparison with those of Wilson and of Start and Wells using the same test though with somewhat different age-groups. The mean score of the 11-year old girls in Northern Ireland, also in 1972, was 0.4 points above that of the boys; their English

counterparts in 1971 however were 0.14 points behind the boys there. At age 15 again the Northern Ireland girls led by 0.47, while the English girls were now ahead by 1.46 points. By 1976 however, in Northern Ireland the mean sex differences were negligible or had disappeared. Comparing the percentile points in Table 8 with those of both the earlier studies shows further close similarities. The directions of difference found here are identical with those of the English pupils (mean age 11.32) where the boys were superior at each percentile from the 40th upwards, with the girls superior from there downwards. In the Northern Ireland sample of 11-year olds the pattern is identical, but with the cross-over point at the 50th percentile.

A general comparison of the mean reading scores of the pupils within school type in single-sex schools (Table 10) shows that on average the boys were ahead in the Secondary, whereas there was no significant difference in the Vocational sector.

TABLE 10

N.S.6 Scores: Sample Comparison of Boys and Girls within School Type

School Type	Boys	Girls	Mean Diff.
Secondary & Sec. Top	n = 951 $\bar{M}$ = 39.12 (S.D. 10.6)	n = 1,282 $\bar{M}$ = 37.6 (S.D. 10.0)	1.52 ***
Vocational & Comprehensive	n = 767 $\bar{M}$ = 29.99 (S.D. 11.7)	n = 377 $\bar{M}$ = 28.85 (S.D. 9.9)	1.14 N.S.
*** $P < 0.001$		N.S. = not significant	

This discrepancy suggests a greater selectivity in admission to boys' Secondary schools than to girls', and is probably related to the fact that far more boys than girls attend Vocational

38 schools. It is consistent with Greaney and Kelly's (1977) finding on both first and third-year samples in the single-sex, large schools. Nevertheless, their suggestion that "real sex differences in reading attainments" may exist in Irish post-primary schools overall, in so far as this refers to mean scores, is not supported by the present research, using a test that was free of sex bias.

However the greater selectivity suggested by the enrolment data (see Appendix III), in admitting boys to Secondary schools, is also confirmed by the slightly greater difference between school-type means (of Secondary vs. Vocational) in the case of boys (9.13) than in the case of girls (8.75).

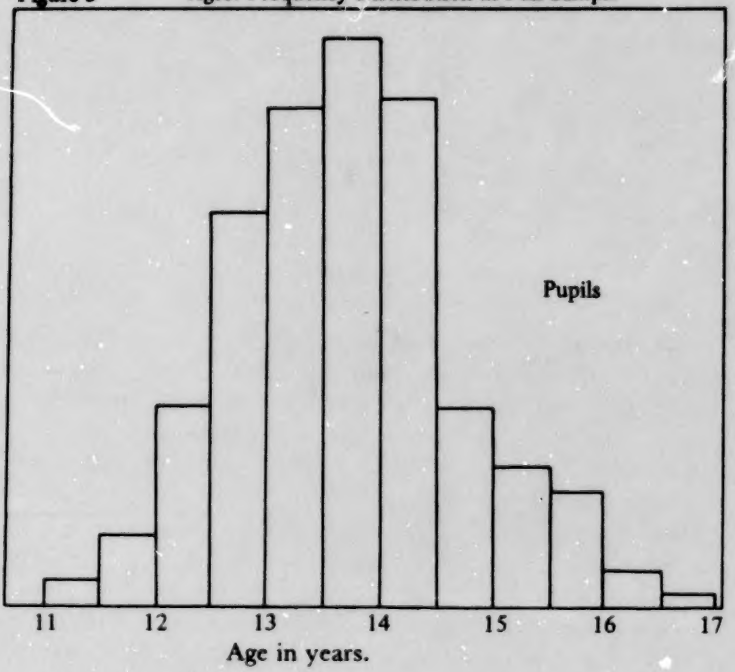
Reading achievement and age

Since it was a grade cohort that was sampled here the variable age really amounted to age-for-grade. The ages of the sample showed a surprisingly wide range indeed, from 133 to 205 months, or a range of precisely six years (see Figure 3), but with 55.7 per cent of them falling between 13 and 14 years, while the population mean age was 13.5 years ($SE_{\bar{M}}$ – .25).

The mean age of the sample itself was 13.52 years with a standard deviation of 8.46 months, while the pattern of mean reading scores per age-group matched the commonsense expectation that the younger the pupil for grade, the higher his reading achievement. As expected, reading score for the full sample also showed a significant inverse correlation ($r = -0.28$) with age, while the co-efficient of linear regression of score on age here was $b = -0.36$. This too is close to the corresponding figures of 0.38, 0.29 and 0.39 obtained by Wilson (1973, 1977) and by Start and Wells (1972) respectively in their surveys. The closeness of all these findings – disregarding the opposite signs, of course – is especially interesting in that theirs are based on age samples, and therefore may or may not be absolutely com-

parable. Thus, while ours must be less representative of the extreme age groups here, it might be no more so than an age sample would be of the extreme grade 'wings' within it.

Figure 3 Ages: Frequency Distribution in Full Sample



Reading and aspects of schooling

As with the pairs of variables already examined, reading achievement and school type were isolated in order to examine their interrelationship, though doubtless this was affected by other factors. Both sample and population estimates appear in Table 11. Appendix XI refers to the computation of population mean scores, while Appendix XII refers to the computation of the error variance of the mean per school type.

TABLE 11

Reading Achievement Scores and School Type

	Secondary (n = 2,178)	Vocational (n = 1,077)	Secondary Top (n = 55)	Comprehensive (n = 67)
N.S.6 Sample Mean Score	38.37	29.43	33.29	32.50
Standard Deviation	10.31	11.08	8.61	12.09
N.S.6 Population Mean Score	38.03	29.23	33.11	32.74
$SE_{\bar{M}}$	0.42	0.50	1.49	1.04

Analysis of variance based on the sample data showed that the mean reading scores of the pupils in the four types of school sampled, differed significantly overall (F ratio = 174.09, $P<.01$), while a t-test (one-tail) of the difference between the means of Secondary and Vocational only, showed their difference (8.94) also to be significant ($P<.01$).

Mean reading standard therefore, was significantly higher in the Secondary than in the Vocational sub-sample, with a slightly wider dispersion of scores in the latter. As the sampling of the Secondary Top and Comprehensive sectors did not correspond exactly to that of the major sectors, for reasons already given, generalisation from sample to population in their case can only be tentative. Where they were combined with the major sectors for computation purposes they would introduce an unknown source of error, but since they comprised only one per cent of the full sample between them, this was not regarded as serious.

In passing it is interesting to note that 13.41 per cent of the variance here was associated with school type (Secondary, Vocational, etc.) while the remaining 86.59 per cent was associated with variation among pupils. A further analysis of the

variance of reading scores by individual schools however showed that 26.17 per cent of it was attributable to variation between schools, while 73.83 per cent was due to variation between pupils within schools. Peaker (1967) estimated as a "rough guide" that in primary schools, 3 per cent would be due to the area, 7 per cent to the school, and 90 per cent due to variation between pupils in a three-stage stratification, or 10 per cent due to schools and 90 per cent to pupils in a two-stage procedure.

Still investigating school type, the sample mean and standard deviation of each of the three main variates were found for the combined Secondary and Secondary Top on the one hand, and Vocational and Comprehensive on the other.[2] These pairings seemed reasonable in view of their affinities of age and school characteristics. The resulting group means are shown in Table 12.

TABLE 12

Comparing Combined School Types on the Chief Variables

Variable	Secondary and Sec. Top (n = 2,233)	Vocational & Comp. (= 1,144)	Mean Diff.
Mean N.S.6 Score	38.24 (S.D. 10.3) (Skewness – 0.289; Kurtosis – 0.299)	29.60 (S.D. 11.16) (Skewness – 0.346; Kurtosis – 0.184)	8.64 ***
Mean Age (Months)	160.23 (S.D. 8.4) (Skewness 0.055; Kurtosis – 0.457)	166.21 (S.D. 8.5) (Skewness 0.697; Kurtosis 2.045)	-5.98 **
Mean Birkbeck I Score	21.24 (S.D. 7.7) (Skewness 0.346; Kurtosis – 0.184)	15.96 (S.D. 8.5) (Skewness .579; Kurtosis .006)	5.28 **
*** $P < 0.001$		** $P < 0.01$	

2. The descriptive constants of the frequency distribution curves of the full sample for all three variables are given in Appendix X.

42 With such small numbers in the smaller sectors, the effects of the combination of school types on mean differences were marginal, .3, .2, and .1 respectively, still leaving highly significant differences ($P < 0.001$) between the Secondary and Vocational means alone on each variate. Another comparison of scores between the two groupings, this one in terms of percentiles, is given in Table 13; it will be recalled that the scale of raw scores on N.S.6 is 1 to 60, and on Birkbeck 1, 2 to 50.

TABLE 13

N.S.6 and Birkbeck 1: Percentile Points of Score Distributions of School Types

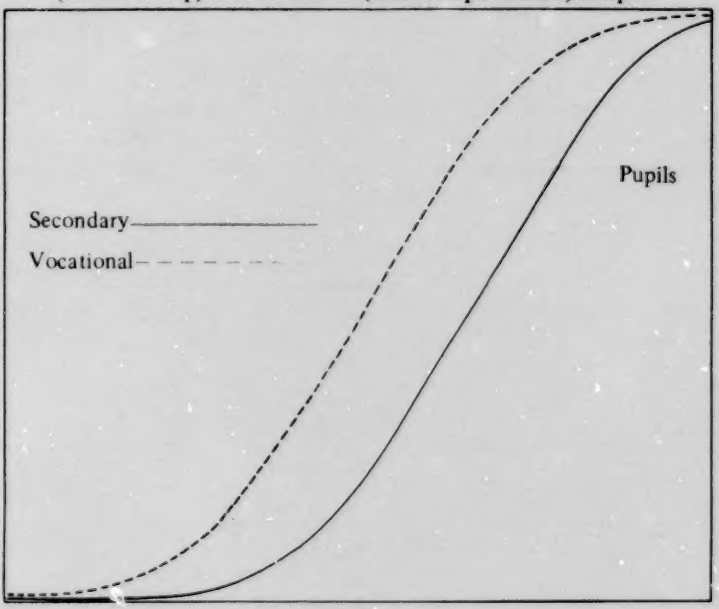
	N.S.6			Birkbeck 1		
	Secondary & Sec. Top	Vocational & Comp	Diff.	Secondary & Sec. Top	Vocational & Comp.	Diff.
P90	53.35	45.35	8.00	33.25	26.56	6.69
P80	48.59	39.87	8.72	29.07	22.99	6.08
P70	45.48	36.36	9.12	27.03	19.22	7.81
P60	42.62	33.77	8.85	23.50	17.09	6.41
P50	39.76	30.69	9.07	20.91	16.50	4.41
P40	36.92	27.58	9.34	19.13	14.59	4.54
P30	34.15	24.57	9.58	16.59	12.62	3.97
P20	30.67	20.87	9.80	14.75	10.56	4.19
P10	25.36	16.06	9.30	11.06	8.41	2.65
	Mean diff. 9.09			Mean diff. 5.19		
P90-P10	27.99	29.29		22.19	18.15	

At each decile point on both these scales therefore, the Secondary stream pupils were superior to the Vocational stream, as comparison of their cumulative frequency curves illustrates

(Fig. 4). The direction of this difference is in line with that between means, while the relative consistency of differences in reading as contrasted with reasoning scores is noteworthy. Attention is also drawn to the *greater spread* of standards in reading test scores in the Vocational than in the Secondary sector. This contrasts interestingly with the findings of Greaney (1973, p. 97), although Greaney and Kelly (1977) did find the Secondary superior to the Vocational at each decile point, albeit in a truncated sample of Vocational schools. A similar, though more pronounced, trend of increasing superiority moving down the decile points, was also found in their first year sample.

Figure 4

Cumulative Frequency Curves of N.S.6 Scores of Secondary (incl. Sec. Top) and Vocational (incl. Comprehensive) samples



44 There was, of course, some overlap as well between these sectors, in the present study, with almost 20 per cent of the Secondary reading below the level of 50 per cent of the Vocational on the one hand, and again 10 per cent of the Vocational reaching a higher level than 60 per cent of the Secondary on the reasoning test, on the other.

The question now arose as to how far the wide gap observed between the mean reading scores of these two groups could be accounted for by their systematic differences in age and reasoning scores. The technique used to answer this question was analysis of covariance. Covariance itself is the average of the deviation scores of the variables concerned. That part of the sums of squares that is due to the correlation between the independent variables in question is removed, and the adjusted group means themselves compared by means of the t-test. The usual requirements of linearity and homoscedasticity within the sub-groups (cf. Popham, 1967), were tested and met in the data.

TABLE 14

Effects of Covariance Analysis on N.S.6 Means

School Type	Original Means	Adjusted Means, Age held Constant	Adjusted Means, Birkbeck 1 Score held constant	Adjusted Means, Age and Birkbeck 1 Score held Constant
Sec. + Sec. Top	38.24	37.78 ($SE_{\bar{M}}$ 0.23)	36.91 ($SE_{\bar{M}}$ 0.19)	36.81 ($SE_{\bar{M}}$ 0.19)
Voc. + Comp.	29.60	30.51 ($SE_{\bar{M}}$ 0.32)	32.19 ($SE_{\bar{M}}$ 0.27)	32.40 ($SE_{\bar{M}}$ 0.28)
Mean diff.	8.64	7.27	4.72	4.41
		t = 18.06***	t = 14.09 ***	t = 12.68 ***
*** $P < 0.001$				

Analysis was first carried out holding Birkbeck 1 score constant, second holding age constant, and third holding both constant simultaneously. Table 14 shows the resulting effect. The t-value of the difference still remaining after the adjustments, shows that the adjusted mean of the Secondary group still remained significantly superior to that of the Vocational group, indicating that the combined group differences in age and reasoning ability accounted for slightly less than half of the difference between their mean reading scores.

To sum up, type of school attended distinguished significantly among levels of reading achievement, independent of the effects of age and reasoning test score combined. The standard deviation of scores both in reading and inductive reasoning was greater in the Vocational than in the Secondary sector. As we shall see later, the proportions of pupils in each of the school types falling into the categories backward and advanced readers differed widely.

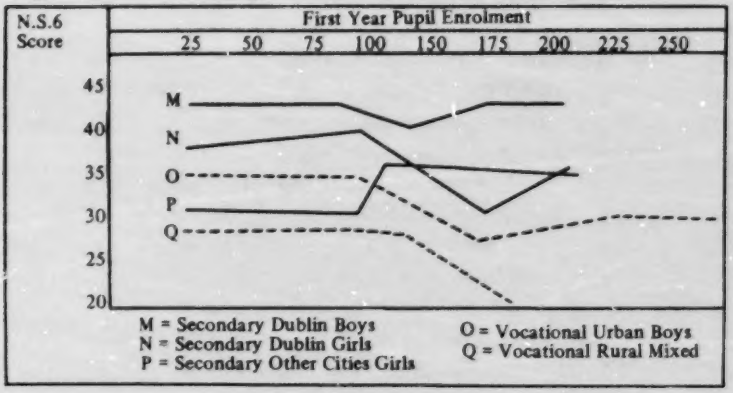
Size and Location of School

If one is to apply the terms large or small to schools one is forced to choose an arbitrary dividing line between them, since these concepts will be relative to the location and the type of school in question. They will vary over time as well e.g. the average Secondary school in Ireland today is almost certainly larger than a decade ago. However it seemed worthwhile investigating any relationship between reading standards and school size, whilst bearing in mind that school size, like any portmanteau variable, will scarcely affect standards independent of other influences – particularly in the case of first year, post-primary pupils. The fact that more of the Secondary are small and more of the Vocational large, by any criterion, must also be pointed out.

The analysis was carried out in the case of five individual strata as shown in Figure 5. Each of these was sub-divided into

46 the number and sizes of category most appropriate to its own school enrolments.

Figure 5 Reading Standard and School Size in Five Strata



As strata M,N and P were urban Secondary schools, the first one of boys only, the others of girls only, the school-size related findings here are by no means uniform within the Secondary sector, showing a trend in favour of the large school in stratum P and little variation within M. A marked downward trend emerges however, in the Vocational sector with increased school size, in both urban boys' schools O, and rural co-educational schools Q. In general, increasing school-size up to a threshold of somewhere about 100 first-year pupils was either of no significance or slightly advantageous. Increase above this point had varying effects within Secondary, but was accompanied by deteriorating standards in Vocational schools, all the more pronounced if these were rural.

Since size here was measured in terms of first-year enrolment it was not possible to relate this directly to overall size-of-school figures. It does however locate the lowest average reading standard in the largest of the Vocational schools, whether urban or rural in terms of first year enrolment.

Not merely in the Vocational sector but in the full first-year sample, it was found that attendance at a rural school tended to be associated with lower reading achievement. This finding needs careful interpretation however, since fewer Secondary than Vocational schools are located in rural areas, and besides, the location of boarding schools may be unrelated in most cases to the geographical location of their pupils' homes. The general finding here seems to bear out that of some other studies e.g. Wiseman (1966) and Morris (1966) while its conflict with that of Ó Baiolláin (1972) could be due to the fact that his study was confined to one town of about 13,000 population, and its hinterland.

Type and number of primary schools attended

It was hypothesised that the average reading achievement of pupils (n = 316) who had come from the small number of private primary schools would be higher than that of pupils who had attended National Schools. Analysis of the data yielded the following result: Chi-square = 83.9; d/f = 2; $P < 0.001$, showing a highly significant association between kind of primary school attended and reading achievement score, in favour of those from private schools. This phenomenon may be largely related to pre-selecting social class factors in the pupils' homes, rather than to the quality of schooling as such.

The number of (primary) schools attended prior to moving into second level was also investigated. The number ranged up to eight (reported by two respondents) with .27 of the pupils reporting more than three. The result of the analysis (Chi-square = 31.15; d/f = 8; $P < 0.001$) showed that reading score tended to *improve* with an increase in the number of schools attended, although the evidence from other studies of this question is on the whole inconclusive.

Lastly the hypothesis that the pupil's motivation to remain at school would be significantly associated with his standard in reading was upheld (Chi-square = 207.9; d/f = 8; $P < 0.001$) in

48 those cases (n = 2,527) where a clear response was given. The data showed that a number (4 per cent of the sample) wished to leave school at 14, then the youngest age permitted, for whatever reason. A further 25 per cent of the sample however had not reached a decision on the matter, while 29.4 per cent of all wished to remain to age 18 which would be the typical age of completing a secondary course. In general, the higher one's reading standard, the longer was one likely to wish to remain in school, and vice versa.

Reading, age and intelligence

The interrelationships of both reading and reasoning test scores with age were examined in terms of frequency distributions and inter-correlations in order to see how far each affected the others. Table 15 gives their matrix of inter-correlations, whilst Appendix X gives the descriptive constants of these three variables.

TABLE 15

N.S.6. Birkbeck 1 Score and Age: Correlation Matrix

	Birkbeck 1	Age
N.S.6 Score	.6033 **	- .2699 **
Birbeck 1 Score		- .2978 **
	** $P < 0.01$	

Of all the factors studied in conjunction with reading standard here, inductive reasoning ability as measured by Birkbeck Test 1 showed by far the highest correlation with it (r = .6). This is consonant both with those theories which regard reading as a problem-solving process (Thorndike, 1917), and again with those which regard low intelligence as one, if not the major

determinant of reading difficulty. The latter was the view held by a majority of teachers in two English studies (Ravenette, 1968; Morris, 1966).

All the correlation coefficients given in Table 15 were found to be statistically significant. Expressing their interrelation in terms of variance, the variation in Birkbeck 1 scores was associated with 36.4 per cent (r^2_{12} x 100) of that in N.S.6 scores. This bears favourable comparison with other studies, many of them involving much longer and more elaborate tests of general cognitive functioning. Combining age with reasoning test score increased this to 43.7 per cent of the total variation in reading scores, still leaving 56.3 per cent unaccounted for.

The multiple determination of reading standards

The measurement techniques used here were of many kinds varying from equal interval scales to the purely categorical.

TABLE 16

Multiple Stepwise Regression Analysis

Variable	Multiple Correlation (r) with N.S.6	Multiple r-squared
Birkbeck 1 score	0.6033	0.3642
No. of books at home	0.6328	0.4005
Recency of reading	0.6443	0.4151
No. in family	0.6531	0.4265
Pupil's preferred school-leaving age	0.6585	0.4337
Frequency of reading	0.6632	0.4398
Parents' preferred school-leaving age	0.6666	0.4443
No. of schools attended	0.6673	0.4453
Age	0.6681	0.4463
Attitude Scale score	0.6683	0.4466

50 Sophisticated analytical procedures therefore, based on correlation coefficients, could only be undertaken by making assumptions that would be met in varying degrees.

An attempt was made nevertheless to investigate the total amount of variation in reading score that could be associated with the ten more clearly continuous variables used here, thus omitting school type, sex of pupil, occupational status and population of area from the reckoning. The results of a multiple stepwise regression analysis thus carried out are shown in table 16 in order of the sequence of steps taken, and with N.S.6 score as the criterion variable. (Table 16, page 49)

As Table 16 shows, about 45 per cent of the total variation in reading score was associated with these variables combined, thus adding little to the information given in table 15. This was more or less as expected and in a study with a limited explanatory aim it seemed a satisfactory result.

Both occupational status and population of locality did show significant relationships with reading achievement however, on non-parametric tests. The results are given in table 17 which shows the Chi-square relationship of all variables except reasoning score, age and sex with reading score itself.

As table 17 indicates, each of these variables showed a statistically significant relationship with reading, confirming what was already known in some cases. But the list is far from exhaustive and really confirms the complex nature of reading, and the multiplicity of different factors that bear on it.

Cattell's theory of fluid and crystallized intelligence

A number of hypotheses were now tested with reference to the usefulness of Cattell's theory of fluid and crystallized intelligence, treating Birkbeck 1 score as exemplifying the former and N.S.6 score as exemplifying the latter area.

TABLE 17

Chi-square Test of Relationships with Reading Score

Variable (Question No.)	Chi-square value	n	d/f	P
Motivation				
Reading frequency (5)	228.12	3,367	8	***
Preferred age of leaving school (4)	207.9	2,527	8	***
Reading frequency (12)	203.78	3,377	8	***
Reading interests (6)	202.99	3,205	36	***
Reading interests (10)	155.67	3,366	4	***
Reading interests (11)	139.17	3,333	18	***
Attitude scale score (13)	83.04	3,332	2	***
Home environment				
No. of books at home (8)	380.6	3,372	8	***
Socio-economic status (2)	318.0	3,127	14	***
Parents' preferred age of leaving school (9)	140.7	2,221	8	***
Size of family (1)	93.53	3,377	2	***
Population of town, village or city	72.87	3,377	4	***
Aspects of primary schooling				
Type of primary school attended	83.87	3,377	2	***
No. of primary schools attended	31.15	3,377	10	***

*** $P < 0.001$

Hypothesis one: It was possible to test Cattell's contention (1971, p. 491) that motivation may have "a powerful effect on the generation of crystallized from fluid intelligence", by comparing the mean scores of those with more favourable vs. less favourable attitudes to reading, while holding reason-

52 ing score constant and with the individual pupil's score as the unit of analysis. Table 18 illustrates.

TABLE 18

Motivation and Crystallized Intelligence

n	Attitude Score	N.S.6 $\bar{m}$ Score	Birkbeck 1 Score
291	>20 (High)	25.7 ($SE_{\bar{M}}$ = 0.69)	<12
230	< 20 (Low)	22.9 ($SE_{\bar{M}}$ = 0.55)	<12
$\bar{m}$ difference = 2.8		** P < 0.01	

A more favourable attitude to reading was significantly associated with higher reading achievement among those within the same band of reasoning scores.

Hypothesis two: Since the increase in G_f during the teen years was found by Horn and Cattell (1967) to be steeper than the increase in G_C, it was hypothesized that our reasoning test scores would correlate more closely with age than would our reading test scores. The former correlation (r = -.0298) exceeded the latter (r = -.0269) significantly (P < 0.01), despite their smallness, thus lending support to this hypothesis.

Hypothesis three: The third hypothesis arose out of P.E. Vernon's criticism that "the main weakness in Cattell's theory is the claim that fluid ability tests are largely immune to cultural influences" (1972 a, p. 25) which Cattell (1971, p. 278) seems to hold. The hypothesis tested here was that our test of G_f (Birkbeck 1) would show lower positive and negative correlations with measures of home environment than would our test of G_C (N.S.6). The three indicators of

home environment used, occupational status of the family, the pupil's estimate of the number of books at home, and the number in family, were correlated with test scores for the full sample, using both Pearson and Eta coefficients. Table 19 illustrates the findings.

TABLE 19

Correlating measures of home environment with N.S.6 (G_c) and Birkbeck 1 (G_f) scores

Measures of home environment	N.S.6 (G_c)		Birkbeck 1 (G_f)	
	Pearson	**Eta**	**Pearson**	**Eta**
Occupational status	0.30	0.32	0.26	0.27
No. of books at home	0.35	0.36	0.28	0.32
No. in family	-0.21	0.22	-0.12	0.15

As the trend of the data indicates that it was Birkbeck 1 score which fluctuated less in relation to the three measures of environment – although these would scarcely be independent of each other – the evidence tended to bear out hypothesis three.

All in all these studies added some further weight to the validity of Cattell's dichotomy which it must be recalled, is a relative one, and not absolute. The number of subjects used here was fortunately large, although the extent to which statistical significance indicates psychological significance remains unclear. Yet as far as our statistical measures go, the present study may in a small way add to our understanding of the nature of reading as a cognitive process and the complex relationship between the constructs reading and intelligence in spite of the limitations

 of the operational definitions used here.

The motivation of reading

Motives inhabit a realm that includes both reasons and causes, and the roots of a child's reading habits lie deep in his affective life. The motivation of reading was investigated here as being a further important determinant of achievement – a reader, after all, is not just someone who *can* read, but someone who *does* read. Motivation was examined here in terms of interests, habits and attitude towards reading overall, each of which, as we have seen, was found to bear a significant relationship to reading standard.

On both measures of frequency the boys were found to read less frequently than the girls, with about twice as many of the latter opting for the highest level of frequency, and three to four times as many of the boys in the lowest frequency category. Again, analysis of the responses to the Attitude-to-reading scale showed a distinct sex preference in favour of the girls (Chi-square = 224.6, d/f = 32, $P < 0.001$).

This could reflect a seasonal difference in preferred pastimes between the sexes, since our survey was taken in the Spring months, whilst any study of this kind must interpret preferences in terms of actual availability. Nevertheless the sex differences given above find some support in other studies (e.g. Miller, 1967; Scharf, 1973).

Definite differences in reading interests between the sexes emerge about age 8, and crystallize about age 12–16 (Gray and Munroe, 1929). Both reading interests and genre of presentation (books, newspapers/magazines, or comics) were found here to distinguish significantly between the sexes with indications of both a wider range of interests and more mature preferences among the girls. Several analyses were carried out, showing stronger tendencies to disagreement than to agreement in reading interests between them. Predictably more of the boys were interested in reading about technical subjects (38 to 1), scientific

subjects (4 to 1) and sport (7 to 1). More girls, for their part, preferred adventure stories (which proved impossible to define – and still very popular with the boys), while girls also opted for biographies, and books of fiction in general, in greater numbers. Romance appealed more to the girls, while topical and historical themes appealed equally to both sexes; however the Arts and Classical children's stories appealed to 5 per cent of girls and even fewer boys. Comic-reading seems to be a phase out of which many of our sample were now growing. Of the girls, 56 per cent preferred books, 28 per cent comics; of the boys 39 per cent preferred comics, 36 per cent books. The remainder of each sex seemed to prefer newspaper reading, indicating that this genre was more popular with boys than with girls.

In many respects these findings confirm those from other countries. Elley and Tolley (1972) found that comics begin to decline in popularity from grade four, while Evans (1965) found that brighter pupils lost interest in them earlier than other pupils. The enormous popularity of adventure stories, animal and mystery stories with both sexes about ages 12-16 has been noted elsewhere (Evans, 1965; Elley and Tolley, 1972; Chiu, 1973). Literature generally receives a very low rating in most studies, while the "unyielding resistance to poetry" noted among the boys by Jenkinson (1940) and Yarlott and Harpin (1971) survives with undiminished vigour still. As the sex differences develop however, boys seldom choose girls' books whereas girls will read some boys' books (Robinson, 1971; Zeligs, 1937; Elley and Tolley, 1972).

PART FOUR: BACKWARDNESS IN READING

Incidence and aspects of schooling

The standard adopted here as a criterion of backwardness in reading, viz. a raw score that fell more than one standard deviation below the grade mean, has become conventionally accepted for the purpose (cf. Ministry of Education, 1957; Morris, 1966; Clark, 1970; Wiseman, 1966; N.F.E.R., 1972, *et al*). It corresponds of course to Reading Quotient 85[1], and yields a rather predictable incidence unless the distribution of scores is markedly skewed. Thus 15.9 per cent of the present sample were found to fall below this point i.e. below raw score 23.6 (or, at the 99 per cent confidence level, the percentage backward was between 14.3 and 17.5 per cent). In the upper tail of the distribution 17.2 per cent fell above raw score 46.3, the corresponding cut-off point adopted to demarcate an advanced level of reading. (The difference between these percentages is attributed to the shape of the distribution curve itself rather than to any inherent phenomenon of the population).

The value of the criterion of one standard deviation below and above the mean, to designate backward and advanced readers respectively, becomes more obvious when applied to the comparison of sub-groups, e.g. those attending different types of school. As Table 20 shows, the incidence of backwardness in reading was close to four times as great in the Vocational as in the Secondary sector.

Despite some overlap therefore between the major sectors, the reiterated contrast in all the comparisons is striking, being only slightly modified by the inclusion of Secondary Top and

1. This criterion is a purely operational definition, just as IQ 70 has, by convention, come to be used as the operational criterion of Mental Retardation. The procedure does run some risk of reification unless used with due awareness of its lack of absoluteness.

TABLE 20

Pupil Proportions per School-type designated Backward and Advanced Readers

	Secondary	Vocational	% Diff.	Secondary & Sec. Top	Voc. & Comp.	% Diff.
Backward	8.5%	30.4%	21.9**	8.7%	29.9%	21.2**
Advanced	22.7%	7.8%	14.9**	22.3%	7.4%	14.9**
** $P < 0.01$						

Comprehensive. The 3 or 4 to 1 imbalance in incidence of reading backwardness illustrates the effectiveness of whatever overt and covert processes of selection may determine choice of post-primary school, in maintaining a contrast in reading standards between the sectors.

Although the sampling procedure was not based on a within-school fraction, it was felt that a computation based on a *post-factum*, within-school sampling fraction might, in view of the large numbers involved, yield a fairly similar incidence of reading backwardness. Using the same criterion as above, the actual number of pupils falling below this point in each sample school was then tallied and multiplied by the proportion of the total number of first-year pupils in the school that appeared in the sample. The resulting products yielded a new overall estimate of incidence of 15.43 per cent or 0.47 less than the first estimate. As this would make a difference of no more than 16 pupils in the sample or 273 in the total population it was reasonably close to the pupil-based estimate itself.

Given then that these two estimates were so similar it was thought safe to make some estimate of the average incidence per school within the main school types. The same rationale, viz. application of the varying, within-school proportion, was used in each case. The resulting mean incidence of backwardness per Secondary school sampled was 7.56 per cent, while the mean

58 per Vocational school was 28.16 per cent; this compares closely with the pupil-based proportions which, as we have seen above (Table 20), were 8.5 per cent (Secondary) and 30.4 per cent (Vocational).

Finally it is interesting to note some further data from which our school-based means were derived. Of the 110 Secondary schools included in the sample, 69 (or 62.7 per cent) enrolled some of the pupils designated as backward in reading whilst in these schools the incidence ranged from 0 to 52 per cent. Of the 46 Vocational schools, *none* was found that did *not* have some backward readers; the incidence per Vocational school ranged from 3 to 50 per cent.

The relationship between school factors and reading backwardness showed interesting contrasts of detail. Thus 60.8 per cent of these pupils attended Vocational schools (which actually enrolled only one third of the total cohort), whereas 34.4 per cent of the group in question attended Secondary schools which enrolled about two-thirds of the cohort. No doubt the larger enrolment of boys in the former sector as well as other pre-selecting factors would add to the imbalance, as observed.

Applying our gross location-of-school categories it was found, that whereas 21.5 per cent of the sample pupils in 'village and rural' schools were backward, the corresponding proportion of 'urban' children was 13.4 per cent.

Finally a slight discrepancy in the number of previous schools attended emerged; the median number attended by the backward was 1.57, as against 1.80 for the advanced. This would indicate, as we have already seen above, that greater mobility was associated with higher reading standards, as some previous studies (Whalen and Fried, 1973; Cramer and Dorsey, 1970; and Snipes, 1966) have reported, although others (Frazier, 1970; Pretzlaff, 1970; and Samson, 1966) found to the contrary.

Home environment of the backward readers

Turning to study the home environment then, analysis of the

data for each occupational group (Table 21 below) showed that the simple mean proportion of the combined Higher and Lower Professional groups falling into the backward category was 2.1 per cent; the corresponding mean of non-agricultural Manual Workers (combining Skilled, Semi-Skilled and Unskilled) was 21.4 The child of these manual workers was therefore more than ten times as likely to be a backward reader as the child of professional parents. Indeed confining this comparison to Higher Professional and Unskilled Manual the figures became 1.2 and 29.4 respectively, or a likelihood of 1 to 24.5.

TABLE 21
Proportion of each Occupational Group falling into the Backward and Advanced Reader Categories

Occupational Group	% Backward	% Advanced
Farmers, Farm Managers	22.2	9.2
Other Agricultural, Fishermen	21.4	11.1
Higher Professional	1.2	44.9
Lower Professional	3.0	34.7
Employers, Managers	5.7	32.9
Salaried Employees	8.9	29.8
Intermediate non-manual	11.4	24.7
Other non-manual	17.3	11.4
Skilled Manual	15.8	13.4
Semi-skilled Manual	19.1	6.9
Unskilled Manual	29.4	4.4

Contrasting the low and the high groups, a child in each of the following occupational categories was more likely to be a backward than an advanced reader: both Agricultural groups, Other non-manual, and all the Manual worker groups; The extreme case was Unskilled Manual; a pupil in this category was over six times as likely to be backward as advanced.

60 Comparison of data such as these with other categorical data for what are nominally similar groups, must be cautiously undertaken. However if we do as Fraser (1959) did, i.e. regard those occupational groups where more were backward than advanced, as being at a disadvantage, we find the cross-over point in ours occurring at the 'Other Non-Manual' level with 'all Agricultural' below this also. This places the pivot of the see-saw in the present study just one level higher than that found by Fraser in Aberdeen.

The backward tended to come from larger families than the advanced. Of the sample pupils, 1,884 came from families of under five children, while 1,484 came from larger families. Comparing the two groups, it was found that 11.5 per cent of those from 'smaller' families (less than 6 children) were backward as against 21.2 per cent of those from 'larger' families (more than 6 children). Besides, the median size of family of the poorer readers was 6.7 while that of the better readers was 4.78.

Size of family might not be unrelated to religious grouping. As regards religious affiliation, it was found that holding number in family constant at more than three, no significant difference in mean reading score was found between Roman Catholic (n = 1,585) and Protestant children (n = 40). Nevertheless a comparison of the medians showed a trend in favour of the latter.

The median reported number of books in the home did however distinguish between the backward (at 2.64) and the advanced (4.06) readers, using a five-point scale. As Table 22 shows, none of those from homes *without any* books was an advanced reader, while 45 per cent of them were backward. On the other hand, a child from a home with 100 books or more (as estimated by himself) was five times as likely to be advanced as to be backward. This table also shows the high value of the Chi-square relationship between reading score and number of books in the home.

Nevertheless number of books in the home did not fully

TABLE 22

Reading Level and estimated Number of Books in Pupil's Home

N.S.6 Scores	No. of Books Categories					
	None	< 5	5–50	50–100	100 +	Total
	n	n	n	n	n	
0–23	18	78	271	109	59	535
24–46	22	130	1056	498	550	2256
47–60	0	4	144	123	310	581
Total	40	212	1471	730	919	3372
					No data	5
						3377
Chi-square 380.6; d/f=8; P < 0.001 ***						

compensate for a lower reading standard in all cases. This was found when, holding the number of books in the home constant at the interval 5–50, the mean score of the advanced readers ($\bar{x}$ = 35.2) still exceeded that of the backward ($\bar{x}$ = 16.9) by a t-value (87.5) that was significant on a one-tail test.

Describing the backward readers – personal data

In order to pin-point more clearly the status of the backward group on the other variables, their returns were compared with those of the advanced readers in many of the following analyses. As we might expect from the data already given, the backward readers had a significantly lower mean score ($P < 0.01$) on the Birkbeck 1 test, than the advanced group; the difference amounted to 8.3 points of raw score. There was also a marked sex difference between the percentages of the backward who were boys(58.7) and girls(41.3), a difference that was significant

62 at the 5 per cent level.

The question of a specific reading difficulty was investigated vis-à-vis sex differences here by converting Birkbeck 1 score to a quotient, and holding it constant at 90 and above. The sex differences in reading achievement were then examined as shown in table 23.

TABLE 23

Sex ratios in degrees of Reading Disability

Backward in Full Sample	% who were boys 58.7	% who were girls 41.3
(Holding Reasoning Quotient constant at 90+)		
N.S.6 ($\tilde{M}$ – ISD)	60.4	39.5
N.S.6 ($\tilde{M}$ – 2SD)	77.7	22.2

The imbalance between the sexes in specific reading difficulty becomes dramatically clearer therefore as we move down the scale of reading achievement, whilst holding reasoning level above a constant point.

The mean age of the backward readers was 6.8 months greater than that of the advanced readers, while they also seemed to wish to leave school earlier, and to perceive their parents as desiring them to leave school earlier, than did the advanced readers (see Table 24 page 63).

It is interesting to note here that the discrepancy between pupil and parent in median ages of preferred school-leaving, was somewhat greater for the backward (1.52) than it was for the advanced (0.60). The former reported themselves as disagreeing more than twice as frequently with their parents on this question, suggesting considerably more reluctant students among

TABLE 24

Backward and Advanced Readers: Personal Variables

	Median Scores on 5-point scale	
	Backward	Advanced
Pupil's preferred school-leaving age	2.58	3.77
Parents' preferred school-leaving age	4.10	4.37

them.

Motivation and reading interests of the backward

It was found that roughly one third of those who "can't remember" when they last completed a book, and as many of those who "never read", fell in the backward category. The contrast with the advanced here too was somewhat predictable, with the comparison of medians in each case favouring those who were of a higher reading standard, as Table 25 shows.

TABLE 25

Motivation of the Backward Readers

	Median Score on each scale	
	Backward Readers	Advanced Readers
Frequency of Reading (1)	1.53	2.71
Frequency of Reading (2)	3.02	3.66
Attitude to Reading	20.88	24.80

One side-light on motivation that emerged was the fact that since attitude scores (which had a fairly symmetrical and uni-

64 modal distribution) showed a lower correlation with achievement ($r = .1231$) among the backward than among the advanced ($r = .1609$), they were associated with less of the variance in reading achievement among the former group.

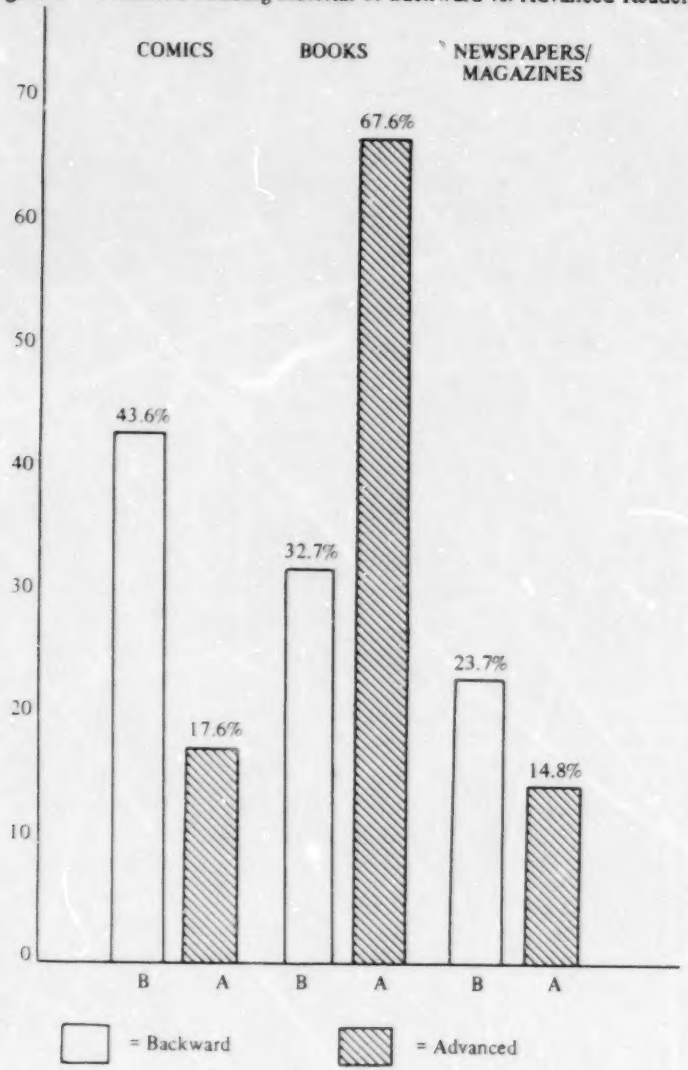
The responses of the backward readers to the open-ended question on reading interests revealed a remarkable number interested in writing about themselves. Typical titles they would choose to write on – "My Life at School", "The Misery of Schooldays" and "The Life-story of a Boy in the country who is a Messer" – are eloquent enough. First in popularity with them however came animals, with sport ranking second.

Their range of reading interests was remarkably restricted indeed, with books on animals or sport comprising over 70 per cent of their first preferences on an open-ended question, whereas these two categories comprised 48 per cent of the first preferences of the advanced readers. The latter opted for adventure, and for scientific topics in much greater numbers, although technical subjects attracted both groups equally. All in all the pattern of responses of the backward readers supported an impression of functioning at the stage of concrete mental operations, in Piagetian terms, indicating a lower level of intellectual maturity in their case.

The question on preferred medium of reading (See Figure 6) showed that the Comics/Annuals category attracted the largest proportion of the weakest readers, being also their preferred medium on the whole.

Approaching the comparison between backward and advanced pupils in another way, it was found that when the values of the non-continuous variables (except classified reading interests) were held constant, each of the following variables distinguished significantly ($P < 0.001$) between the two levels of reader: frequency of reading (1) and (2), attitude to reading, socio-economic status, number of schools attended, population of area, and age of school-leaving preferred both by the pupil and by his parents for him.

Figure 6 Preferred Reading Material of Backward vs. Advanced Readers



66 *The backward reader*

The typical retarded reader does not exist. Yet in so far as we may think in terms of such abstractions, we ought to see him, not as a child apart but as a child like any other. Against this background of similarity with others however, a few characteristics may be more accentuated in his case.

More likely to be male than female, the probability is about two to one that the backward reader attends a Vocational school, perhaps a large one. He will tend to be older than average for first year – with one chance in three or four of his being aged 14 or more – and keen to leave school as early as possible. He may even be aged 16 or 17, though still in first year, whilst attending school reluctantly anyhow. In his year group at school, the retarded reader is more likely to figure among the weakest 20 per cent in general ability and is frequently functioning at the "concrete operations" level of intellectual development. An unusual affinity for animals is a frequently observed trait, whilst a negative attitude to himself as a person is not uncommon.

If, as is slightly more usual, he lives in a rural area, then his family is more likely to be engaged in agricultural work. The home will commonly be one where reading is a rare occupation – in some cases it will be totally devoid of any books whatever. Thus the young person himself will probably be a reluctant reader, at best seeing reading as something that has to do exclusively with school and lessons. If he does read out of school however, his favourite genre is likely to be comics, in whose cartoon figures he may immediately recognise "me the constantly clumsy one", or "me – the greedy over-eater", or "me – more powerful than anyone else", etc. There is reason to believe indeed that reading will have lost out largely or totally in the competition with television for his leisure hours – though football can be another keen competitor. One such pupil summed up his overall attitude to *reading* as follows: "I rather football than reading".

Reading comprehension at the stage of early adolescence is an outcome of many years' formal learning and many more of informal experience, based on the individual's genetic endowment. It emerges now as a most complex process, or set of processes, cognitive, perceptual and emotional. Determined more by general intelligence perhaps than by any other single factor, reading standard is, by this stage, a key area of personal and scholastic functioning. Its progress therefore facilitates, as its retardation impedes both intellectual growth and overall personal development. Retardation in reading then is a personal failure with inevitable social ramifications.

A considerable problem of reading backwardness was found to exist among first-year pupils in post-primary schools – though this was not surprising in view of the findings from similar studies elsewhere. Its existence here was corroborated by the opinions of the heads of a number of these schools. While it was not possible to discover whether reading standards in the schools as a whole are improving or declining, in the absence of any earlier comparable study, it is hoped that the present findings may be used as a baseline in determining such vital public knowledge in the future.

The problem was found here, as elsewhere, to occur among both boys and girls, though rather more prevalent among the former, and again to increase in incidence with remoteness from centres of population. Besides, it was found to be more prevalent among the weakest pupils. Thus although the Vocational pupils were on average one year older than their Secondary counterparts, removal of the effects of differences in reasoning ability and age combined still left a significant difference between their mean reading scores.

The greater prevalence of the problem in the Vocational than in the Secondary schools, especially as the former increased in size, must derive considerably from pre-selecting factors, including traditions and social attitudes. These survive vigorously

68 despite the endeavours of the educational authorities, and tend to be mutually reinforcing. In short, reading difficulties were seen as resulting not from any single cause but from a constellation of mutually predisposing, facilitating or inhibiting factors, whose combinations vary from person to person.

As the research has demonstrated, reading standards result not only from the efforts of teachers and the abilities of pupils, but from the interaction of these with other influences in varying combinations. The attitudes, aspirations, and levels of literacy of parents have all been shown to determine whether their children read at all and how well they do so. Likewise the complexity, the self-questioning and the care of the larger society outside, have been found to support or constrain the best efforts of the school to raise reading standards. Yet the high road to improvement is through the schools.

Change within education itself may be relatively easily effected. Change in personal and social attitudes may be less directly attainable. Improvement in the quality of both as they bear on problems of literacy will demand heightened levels of public awareness and educational self-appraisal in our society. But since reading remains the first of the "three r's", whilst level of literacy is the touchstone of education, from the brightest to the dullest, it is unthinkable that these new heights will not be scaled.

ABSTRACT OF READING SURVEY

This national survey measured the standards of reading of first year pupils in post-primary schools throughout the Republic of Ireland in 1971–72, by sampling them in a representative way so as to make it possible to generalize from the sample to the full cohort. The response rate of 97 per cent of schools, added to the fact that the sample comprised almost one-fifth of all post-primary schools, and were spread throughout eighteen counties, testify to the scientific strength of the findings.

Reading was measured by means of the N.S.6 test (N.F.E.R. 1954) whose levels of validity and reliability were established as satisfactory. Several personal, social and scholastic factors were studied in relation to reading itself. Some of the chief findings were as follows:

1. The mean score of the full cohort on the N.S.6 test was estimated at 34.97 ($SE_{\bar{M}}$ 0.37).

2. The mean reading achievement of boys and girls did not differ significantly, while the average age of each sex was 13.5 years.

3. The incidence of backwardness in reading among the whole cohort was estimated according to a conventional criterion, at 15.9 per cent.

4. Five per cent more of the boys than of the girls were backward readers.

5. Holding reasoning score constant at average level or above, the incidence of specific reading disability was four times as

prevalent among the boys as among the girls when two standard deviations below the mean reading score was reached.

6. Differences in inductive reasoning ability, as measured on Birkbeck Test 1 (Cavanagh 1972) accounted for about one-third of the variation in reading level.

7. Variations in age, in scholastic aspiration, in attitudes to reading, interests and habits of reading among the pupils, also affected standards.

8. Reading interests and habits varied considerably as between boys and girls, between Secondary and Vocational pupils, and between good and poor readers.

9. Using one standard deviation below the grade mean as the criterion of backwardness, it was found that 8.5 per cent of the pupils in Secondary Schools were backward readers, whereas 30.4 per cent of the Vocational School pupils were at this level. The differences between the pupils in these two sectors, in age and in reasoning ability combined, only partly accounted for their mean difference in reading standard.

10. 34.8 per cent of the backward readers attended Secondary Schools (which enrolled about two-thirds of all post-primary pupils) whereas 60.8 per cent of the backward readers attended Vocational Schools (which enrolled one-third of all post-primary pupils).

11. Reading difficulty was more prevalent among pupils from lower socio-economic groups, those from agricultural backgrounds, especially those whose homes contained less reading material, and among pupils whose parents wished them to leave school at an earlier age.

12. Reading problems showed no clear relationship with school size in the Secondary sector. They were more prevalent both in large Vocational Schools, and generally in schools of more remote location.

13. Many heads of schools seemed to be aware of the existence of a reading problem, while a number experienced difficulty in coping with it.

14. Some evidence emerged which tended to support Cattell's theory of fluid and crystallized intelligence, as a helpful context for distinguishing between reading comprehension and abstract reasoning.

APPENDICES

APPENDIX I

Validity of the reading test for Irish pupils

Reading as a skill seems to defy definition in terms so clear-cut as to find a consensus among experts. The best reading test available therefore comprises the best operational definition of this skill, whilst the correct psychological interpretation of scores on this test is its construct validity.

Concerning the broad constructs underlying the content of the N.S.6, Start and Wells (1972) maintain that whereas the early items were "designed to test whether a pupil has mastered the mechanics of reading – the power to translate written symbols into meaningful sounds", the later items were designed to ask the question "Can the pupil read to some purpose, like an educated man?" The construct reading comprehension then, as embodied in the test, was not narrowly defined, and was seen as having both its qualitative and quantitative dimensions. Far from being treated merely as another sub-skill, it was seen here (Swan, 1974 b) as the complex focus of a wide range of previous learning experiences: at this stage, probably the best indicator of performance in reading as a whole.

Four empirical investigations of the validity of N.S.6 were undertaken, the first one a cross-validation study using the only extant reading test with local norms, the *Marino Graded Word Reading Scale* (Ó Súilleabháin, 1970). The group amounted to a judgment sample (n = 60) internally balanced so as to reflect approximately the composition of the target population by age and type of school. The resulting product-moment correlation coefficient was $r = .87$ ($P < .01$), a substantial one, despite the divergence between the constructs underlying both tests.

Next, the N.S.6 was administered to complete fifth and sixth grades in both boys' and girls' primary schools, in upper and lower socio-economic class, urban districts. It was also administered to full first and second year classes in one boys' Secondary, and one Girls' Secondary, and one Vocational school of mixed social-class catchment, the combined total sample numbering 391 pupils. A progressive increase in mean score was found corresponding to increasing age and grade. This suggested that the test was capable of discriminating among known groups on these criteria and in the direction expected.

In a third validity study the test was found to discriminate between pupils in higher and lower streams using the first years from two Secondary (n = 44) and one Vocational (n = 10) school. The difference of 9.73 points found between mean scores here, was tested using the t-test for small samples. The obtained t-value of the difference ($t = 4.17$; $P < .05$, one-tailed test) being found statistically significant, the null hypothesis was therefore rejected, and the means were taken as showing a significant difference.

All in all, the N.S.6 was shown to be an acceptably valid instrument for measuring the reading achievements of first year pupils in this country.

Reliability of N.S.6

As no parallel form of the test exists, studies of its reliability had to be confined to estimating its coefficients of internal consistency and stability with the population in question, although these were already known to be very satisfactory for English pupils.

From among the protocols of the first-year pupils already referred to above in the validity studies of the test, thirty were selected, ten from each school, comprising equal numbers of boys and girls as table A1 shows.

TABLE A1
Internal Consistency Study of N.S.6

Sex	Age Range	Raw Scores		
		Range	Mean	SD
Boys n = 15	11:3 – 14:9			
Girls n = 15		13–57	34.92	12.4

The variance of total scores, and the coefficient of consistency were computed yielding the result r = .95. This compared well with those obtained by the N.F.E.R., although the Kuder-Richardson, like all the internal consistency formulae that depend upon a single administration, probably underestimates the reliability of a test.

The stability of the N.S.6 after an interval of two months was also investigated using a sample of first-year pupils as outlined in table A2.

TABLE A2
Stability Study of the N.S.6 Test

Grade	School Type	Ages	1st Testing Mean Score	2nd Testing Mean Score
1st Year	Secondary n = 23 Vocational n = 21	Mean: 13.7 Range: 12.7–15.00	43.81	46.07

Based on the mean gain of 2.26, the coefficient computed here was r = .88 indicating a high level of stability.

APPENDIX II

Developing the Pupil Questionnaire

In selecting topics for the forced-choice item, Question 11, the balance between too much specificity, which is time-consuming for administration, and categories which were too broad and therefore ambiguous, was crucial; again, one had to compromise. Those finally selected were the ten most popular found in a random sample of 50 pilot responses to the open question "If you could write a book what would you most like to write about?", and which showed very high popularity in 300 pupils' essays. They also tended to discriminate well between boys and girls and between those with high and low attitude scores. Despite all this, the list is open to ambiguous interpretation at some points. The questions on reading interests were of course based on two assumptions (a) that the topic a pupil would prefer to write a book about would coincide with his highest current reading interest, and (b) that the order of preference indicated on a check-list would show the relative appeal, though not necessarily the absolute attractiveness of these topics at that particular time. The analysis categories for the open-ended item, Question 6, were based on the most popular items in 100 protocols chosen at random.

Evaluating the Questionnaire

The percentage response is the most important single consideration in evaluating a questionnaire study even with 'captive' samples such as

students in a class, according to Nisbet and Entwistle (1970). Each of the items 1 to 13 on the questionnaire yielded a 100 per cent response rate except 10, 11 and 13, which were omitted or incorrectly answered by one pupil only, in a pilot sample of 66, several of whom were known to be weak readers.

Another study using the protocols of 50 first-year pupils showed that adjacent points on eight of the scales discriminated significantly in all cases ($P < 0.01$) between reading levels (N.S.6) of the various respondents in question. Table A3 illustrates this.

TABLE A3
Testing the Power of Discrimination of Adjacent Points on Questionnaire Items

Item	Adjacent points tested	N.S.6 Mean diff.	Significance
4	2,3	7.80	• •
5	0,1	4.40	• •
7	1,2	6.52	• •
8	2,3	6.16	• •
9	2,3	7.00	• •
10	0,1	9.12	• •
12	1,2	11.04	• •
• • $P < 0.01$			

This was taken as suggesting that the questionnaire might shed some indirect light on standards in reading.

Questionnaire: Final Version

School ..... Name: .....

Age: .....

Now answer these questions:

1. How many children in your family? .....

76 2. What is the name of your father's job? .....

He is a .....

Describe carefully the work he does .....

.....

---

3. What was the name of the school you attended last year?

.....

Write the full address of that school here .....

.....

Which kind of school was it? (Place a tick in the *correct* box only)

National School	☐	Preparatory School	☐
Vocational School	☐	Secondary School	☐

What class were you in last year? .....

---

4. If you could leave school whenever you wished, at what age would you prefer to do so?

14	15	16	17	18	I'm not sure
☐	☐	☐	☐	☐	☐

(Tick only the *one* that is true for you)

---

5. Do you read at all apart from your school work and the homework you must do?

Every chance I get	Quite a lot	Often	Sometimes	Never

(Tick only the *one* that is true for you)

---

6. If you could write a book, what would you most like to write it about?

.....

---

7. How many schools have you attended before you came to this one?

.....

---

8. How many books are there at home, roughly?

None at all	Less than five	Between 5 & 50	Between 50 & 100	More than 100
☐	☐	☐	☐	☐

(Tick only the *one* that is true for you)

---

9. At what age would your parents like you to leave school?

14	15	16	17	18	I'm not sure
☐	☐	☐	☐	☐	☐

(Tick only the *one* that is true for you)

---

10. Which of these three do you spend *most* time reading?

Comics or Annuals ☐ Books ☐ Newspapers/Magazines ☐

(Tick only the *one* that is true for you)

---

11. If you do read books, which *three* of these kinds do you enjoy most?

Stories about animals ☐	☐ History/lives of famous people
Books on sport ☐	☐ Romance
Classics ☐	☐ Travel
Mystery/thriller/detective stories ☐	☐ Books on hobbies/encyclopaedias
Adventure stories ☐	☐ Either funny stories *or* sad stories

(Place a tick in *three* boxes only)

---

12. When did you last read a book from beginning to end?

Over a year ago	Over 6 months ago	Between 6 months and 1 month ago	In the past month	Can't remember
☐	☐	☐	☐	☐

(Tick the *one* that is true for you)

---

13. After each of these sentences there are five boxes. From left to right they mean: Agree; Usually agree; Not sure; Usually disagree; Disagree.
(After each sentence place a tick in only *one* of the boxes, the one that is true for yourself).

		Agree	Usually Agree	Not Sure	Usually Disagree	Disagree
1	I like reading	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
2	I don't have much time for reading because of all the things I do after school.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
3	Reading is one of my favourite pastimes.	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
4	I enjoy most of the reading I have to do for English class at school.	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
5	I don't like reading.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
6	Most school books in English are boring.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
7	I usually prefer to do other things than reading.	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
8	Reading is interesting.	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0

(Make sure you have ticked *each* sentence in question 13)

Given that the technology of attitude measurement is less well developed than that of measuring cognitive functioning, one has to be satisfied with a lower level of effectiveness in the former area. The scale used to elicit the pupils' attitudes to reading was an adaptation of an existing American one of the Likert type, adapted and used by kind permission of its author (Huser, 1967 and 1972). Of the original ten items four were found not to discriminate well; they were replaced by two which were found more efficient, leaving it an eight-item scale in its final form. The two new items added referred explicitly to the pupil's current reading in school, as use of the term 'reading' in the abstract was found, in pilot studies, to be invariably understood as referring to leisure reading only.

A neutral or 'not sure' response position was also added in consultation with the author, extending the range of choice to five points to make for finer discrimination, as indicated in pilot trials, and hopefully to increase reliability (cf Ferguson, 1941). The final version of the scale comprised four generally positive and four generally negative statements each referring to some aspect of reading and presented in a scrambled sequence to prevent response set occurring (cf Edwards, 1957). The scoring of the positive statements, reading left to right was 4,3,2,1,0, with the negative scored in ascending values reading in the same direction; thus the range of possible scores was from zero to 32. In order to prevent any confusion of the pupils in dealing with the demand of a probably unfamiliar task such as this, the field workers were instructed in a standard administration procedure.

The attitude scale in its final form also underwent pilot trials of its reliability with first-year pupils and despite its brevity, the necessarily limited evidence that could be obtained, suggested that it was a reasonably reliable instrument. The item analysis procedure outlined by Edwards (op. cit.,) was used to investigate whether each statement discriminated between two groups of thirty subjects selected as the highest and the lowest overall scorers respectively, from first-year classes in six trial schools. The critical difference value here on a one-tail t-test was 2.7 at the .01 level.

As Table A4 shows, each of the items in the scale used, discriminated significantly between the two groups.

Two studies of the scale's stability over the space of a month or so were carried out. The first, with 23 boys only, yielded a test re-test Pearson

TABLE A4

Reliability of the Attitude-to-Reading Scale: Item-analysis Study

Item	1	2	3	4	5	6	7	8
t-value	6.19**	3.16**	6.25**	8.08**	6.23**	6.91**	17.01**	6.16**
** $P < 0.01$								

correlation coefficient of r = .92. The second, with 20 girls added to the same 23 boys yielded r = .77, both coefficients significant beyond the .01 level. Again, two trials in which the positive and negative items were correlated, using the protocols of two separate groups of 30 pupils, yielded correlations of r = -0.71 and r = -0.63, both significant beyond the .01 level. No doubt some reliability was being sacrificed to brevity, but a moderate amount seemed to have been retained.

Post factum evidence of its reliability too was found by means of a test of the hypothesis that no significant mean difference would be found between sizes of family reported by the boys and the girls of the full sample. The hypothesis was upheld.

Accepting Oppenheim's view that 'at present there is no way of making sure that an attitude scale is valid' (1966) one must trust largely in the face validity of the scale in question. Beyond this, tentative indications may be sought, and here the correlation between pupils' summated attitude scores and their frequency of reading (item 5) responses was investigated. A moderately high coefficient (r = .58) between the two was found, with a sample of 50 pupils, suggesting that the underlying factors are not unrelated. Besides a null hypothesis that low attitude scorers (raw score < 20) would not differ significantly from high (raw score > 20) was rejected at the .05 confidence level, on two groups of 25 pupils. The Likert scale thus appeared to distinguish with some success between levels of reading achievement, while the rate of response to the attitude scale of a pilot group of 66 pupils was 98.6 per cent, not an unsatisfactory one in view of both its position and possible difficulty for some pupils. The mean response rate to all the questionnaire items was 98.3 per cent.

APPENDIX III

Structuring the Pupil Sample

Key to Strata Used	Code Numbers*	No. of pupils in 1970–71 population (1)	No. of pupils in 1971–72 population (2)	Sample pupils as proportions of 1971–72 pop.
Secondary Strata				
Dublin				
Boys Catholic	01	3,065	2,940	.0643
Boys Other Religion	02	119	136	.0504
Girls Catholic	03	3,713	3,797	.0635
Girls Other Religion	04	137	159	.1132
Mixed Catholic	05	220	225	.1156
Mixed Other Religion	06	256	277	.0939
Other Cities				
Boys Catholic	07	1,731	1,852	.0513
Girls Catholic	08	1,976	2,216	.0537
Girls Other Religion	09	11	18	.6666
Mixed Catholic	10	39	29	.4138
Mixed Other Religion	11	88	97	.2887
Rest of Ireland				
Boys Catholic	12	8,904	9,171	.0575
	*			
Girls Catholic	14	10,942	11,585	.0585
	*			
Mixed Catholic	16	4,116	4,259	.0418
Other Religion (All)	17	395	350	.0686
Vocational Strata				
Dublin				
Boys	18	2,424	2,335	.1101
Girls	19	609	721	.0388
Other Cities				
Boys	20	483	540	.0926
	*			
Mixed	22	364	438	.1370
Rest of Ireland				
Boys	23	369	374	.0695
Girls	24	138	143	.1888
Mixed	25	13,815	14,709	.0428
Secondary Top	26	916	849	.0649
Comprehensive	27	814	909	.0740
		55,644	58,129	

N.B. The asterisks indicate the intentional gaps in the sequence. The following cells were empty in 1971–72: Dublin Vocational Mixed; Other Cities Secondary Boys Other Religion; Other Cities Vocational Girls. The Boys, Girls and Mixed Other Religion in Rest of Ireland were collapsed into one (code No. 17 above) in view of small numbers and a trend to amalgamate these schools. The final number of strata used was 24.

APPENDIX IV

Schools in Population and Sample

Stratum Code No.	No. of Schools in 1971–72 population	No. of Schools in 1970–71 population	Achieved Schools as proportion of 1971–72 population
01	31	31	.39
02	5	5	.20
03	41	41	.39
04	6	6	.39
05	5	5	.33
06	5	5	.60
07	19	19	.32
08	24	24	.29
09	1	1	1.00
10	1	1	1.00
11	3	3	.66
12	168	171	.13
14	182	184	.14
16	85	80	.08
17	16	17	.12
18	15*	16	.67
19	7*	6	.29
20	4	2	.50
22	4	4	.50
23	5	6	.33
24	2	2	1.00
25	223	222	.12
26	17	17	.18
27	10	9	.12
	879	877	

* 18 Includes 3 Boys departments within mixed schools
* 19 Includes 4 Girls departments within mixed schools

APPENDIX V

Weights applied to score distributions in estimating total population mean from sample data based on both single-sex stratum proportions, and sex-within stratum proportions:–

Stratum Code No.	Stratum Weight (Wh)	Stratum Code No.	Stratum Weight (Wh)
01 (boys)	.0506	18 (boys)	.0388
02 (boys)	.0023	19 (girls)	.0138
03 (girls)	.0653	20 (boys)	.0093
04 (girls)	.0027	22 (boys)	.0042
		(girls)	.0034
05 (boys)	.0020	23 (boys)	.0060
(girls)	.0018		
06 (boys)	.0027	24 (girls)	.0025
(girls)	.0021		
07 (boys)	.0321	25 (boys)	.1605
		(girls)	.0929
08 (girls)	.0384		
09 (girls)	.0003		
10 (boys)	.0003	26 (boys)	.0020
(girls)	.0002	(girls)	.0126
11 (boys)	.0007	27 (boys)	.0092
(girls)	.0009	(girls)	.0064
12 (boys)	.1577		
14 (girls)	.1992		
16 (boys)	.0269		
(girls)	.0463		
17 (boys)	.0032		
(girls)	.0027		

Key, and Summary of above:–

Code 01–17,	Secondary strata,	total = .6384
Code 18–25,	Vocational st ...	total = .3314
Code 26,	Secondary Top stratum,	= .0146
Code 27,	Comprehensive stratum,	= .0156
	Sum of weights	1.0000

APPENDIX VI

Estimating population mean N.S.6 Score: stratum and sex-within-stratum means and contributions to overall mean.

Stratum Code No.	Stratum Mean	Computing Population Mean	Computing Boys' Mean	Computing Girls' Mean
01	43.4293	2.19752	4.3212	
02	40.3333	.09277	.1815	
03	38.6194	2.52185		5.1287
04	42.5000	.11475		.2338
05 (boys)	35.5363	.07107	.1386	.1154
(girls)	31.2000	.05616		
06 (boys)	42.9722	.11602	.2320	.1607
(girls)	37.3611	.07846		
07	39.4099	1.26506	2.4868	
08	36.2816	1.39321		2.8336
09	37.0000	.01110		.0222
10 (boys)	32.1666	.00965	.0193	
(girls)	26.5000	.00530		.0106
11 (boys)	36.0167	.02584	.0517	
(girls)	42.7166	.03844		.0769
12	38.3368	6.04571	11.8920	
14	37.7944	7.52864		15.3181
16 (boys)	34.8506	.93748	1.8436	
(girls)	32.9655	1.52630		3.1054
17 (boys)	41.8750	.13400	.2638	
(girls)	44.8333	.12105		.2466
18	30.8586	1.19731	2.3545	
19	26.9055	.37130		.7560
20	29.4808	.27417	.5395	
22 (boys)	32.1249	.13492	.2666	
(girls)	27.2361	.09260		.1879
23	29.8274	.17896	.3519	
24	29.0749	.07269		.1483
25 (boys)	29.0044	4.65231	9.1509	
(girls)	29.1928	2.71201		5.5174
26 (boys)	19.1667	.03833	.0748	
(girls)	35.3214	.44152		.9042
27 (boys)	33.8849	.31174		
(girls)	31.0938	.19900	.6133	.4042
		34.96724	34.7820	35.1700

N.S.6. Error variance of mean population score (separate boys and girls sub-stratum means have already been recombined here, weighted as appropriate).

Stratum No.	Variance Weight	1 – Sampling fraction	Between schools variance	Total Variance
01	.002560	.93572	1.6056	.003846
02	.000005	.95589	0	0 *
03	.004264	.93652	1.3303	.005321
04	.000007	.88680	4.8057	.000298
05	.000014	.88393	4.7006	.000583
06	.000023	.90580	7.8708	.000164
07	.001030	.94865	4.6712	.004564
08	.001475	.94626	1.7797	.002484
09	.000001	.33334	0	0 *
10	.000003	.58621	8.0277	.000002
11	.0000026	.71135	8.4097	.000151
12	.0248693	.94252	.4946	.011593
14	.0396806	.94155	.6023	.022503
16	.0053582	.95829	.13342	.006851
17	.0000348	.93182	4.7018	.000152
18	.0015054	.88588	2.0556	.002739
19	.0001904	.96509	7.8087	.001435
20	.0000865	.90724	2.1925	.000172
22	.0000578	.86271	5.7043	.000285
23	.0000360	.92464	.5714	.000190
24	.0000063	.80986	1.6750	.000009
25	.0642116	.95736	1.1329	.069643
26	.0002132	.93522	21.8092	.004349
27	.0002434	.92614	1.6531	.000373
				.137707
				$SE_{\bar{M}}$ = .371

*In these cells there is no between-schools variance as each had only one school in the sample; this applies to each one-school cell throughout the Appendices.

APPENDIX VIII

N.S.6: Computing Error Variance of separate boys' and girls' mean scores

Boys Strata	Variance Weight	1 – Sampling fraction	N.S.6	
			Var Str $\bar{M}$	Total Var
01	.009900	.93572	1.6056	.0148470
05	.000150	.88393	18.1730	.0002417
06	.000030	.90385	4.4594	.0000666
07	.002980	.94865	4.6712	.0176366
11	.000002	.72094	11.6738	.0000048
12	.096224	.94252	0.4946	.0448568
16	.002798	.95586	0.2778	.0007431
17	.000039	.90655	19.1406	.0006891
18	.005822	.88588	2.0556	.0106020
20	.000335	.90724	2.1925	.0070620
22	.000069	.87805	2.1925	.0013290
23	.000139	.92464	0.5714	.0000734
25	.099540	.96030	0.6522	.0623389
27	.000328	.93458	0.9853	.0003020
				.1607930
				$SE_{\bar{M}}$ = .40102
Girls Strata				
03	.0176360	.93652	1.3303	.0219719
04	.0003030	.88680	4.8057	.0012913
06	.0000185	.90910	0.7249	.0000122
08	.0060996	.94626	1.7797	.0102720
11	.0000032	.70371	11.5586	.0000104
14	.1642681	.94160	0.6023	.0931610
16	.0088736	.95957	0.0066	.0000024
17	.0000303	.84090	42.0332	.0010973
19	.0007896	.96117	7.8087	.0059502
22	.0000476	.84380	72.9589	.0029329
24	.0000260	.81119	1.6750	.0000353
25	.035721	.95196	0.4739	.0161139
26	.0006554	.93288	2.7932	.0017078
27	.0001690	.91375	4.9228	.0076010
				.1621596
				$SE_{\bar{M}}$ = .40269

Age: Estimating total population, all boys' and all girls' means in months.

Stratum Code No.	Stratum Mean	Computing Population Mean	Computing Boys' Mean	Computing Girls' Mean
01	158.0999	7.9999	15.7309	
02	147.6666	.3396	.6645	
03	158.2988	10.3369		21.0221
04	148.4583	.4008		.8165
05 (boys)	163.1818	.3264	.6364	
(girls)	168.0000	.3024		.6216
06 (boys)	154.9278	.4183	.8366	
(girls)	153.5722	.3225		.6604
07	159.4248	5.1175	10.0597	
08	161.5576	6.2038		12.6176
09	146.5000	.0440		.0879
10 (boys)	167.1666	.0501	.1003	
(girls)	166.6666	.0333		.0667
11 (boys)	156.4150	.1095	.2190	
(girls)	152.1333	.1369		.2738
12	160.4349	25.3005	49.7509	
14	161.7773	32.2260		65.5683
16 (boys)	163.5625	4.3998	8.6525	
(girls)	161.4735	7.4762		15.2108
17 (boys)	149.7500	.4792	.9434	
(girls)	152.6666	.4122		.8397
18	165.1255	6.4069	12.5991	
19	163.8166	2.2607		4.6032
20	164.6667	1.5314	3.0134	
22 (boys)	168.7777	.7089	1.4009	
(girls)	171.9722	.5847		1.1854
23	166.6250	.9998	1.9662	
24	167.3499	.4184		.8535
25 (boys)	166.4852	26.7209	52.5261	
(girls)	166.8022	15.4959		31.5256
26 (boys)	169.0000	.3380	.6591	
(girls)	160.5632	2.0070		4.1104
27 (boys)	165.0970	1.5189	2.9883	
(girls)	164.5000	1.0528		2.1385
		162.4802	162.7473	162.2029

APPENDIX X

N.S.6, Birkbeck 1 Scores, and Age, Descriptive Constants of Frequency Distribution Curves (n = 3,377)

	N.S.6 Scores	Birkbeck 1 Score	Age
Sample Mean (and S.D.)	35.32 (11.36)	19.47 (8.31)	13.52 (.71)yrs.
Coefficient of Skewness	- 0.2473	0.3968	0.3514
Critical Ratio (Skewness)	- 5.83 **	9.42 **	8.34 **
Co-efficient of Kurtosis	- .4311	- 0.1579	0.8617
Critical Ratio (Kurtosis)	- 5.90 **	- 2.36 *	9.44 **
Description of Curve	Unimodal Negative Skew Platykurtic	Positive Skew Platykurtic	Unimodal Positive Skew Leptokurtic
* P < 0.05		** P < 0.01	

While the N.S.6 scores and age departed somewhat from the normal curve, both were still fairly symmetrical and unimodal. The Birkbeck 1 Scores however showed a marked unevenness at two points in the scale (about items 5 and 14), which had not appeared in the pilot trials. They were scarcely serious enough however to invalidate its use in computing correlation coefficients.

APPENDIX Xi

N.S.6: Estimating population mean scores by type of school

Stratum No.	Stratum Sample Mean ($\bar{Y}$)	Population Proportions	Population Means
		(i) Secondary	Secondary
01	43.4293	.0793	3.4439
02	40.3333	.0036	.1452
03	38.6194	.1023	3.9507
04	42.5000	.0042	.1785
05 (boys)	35.5363	.0031	.1102
(girls)	31.2000	.0028	.0874
06 (boys)	42.9722	.0043	.1848
(girls)	37.3611	.0033	.1232
07	39.4099	.0503	1.9823
08	36.2816	.0601	2.1805
09	37.0000	.0005	.0148
10 (boys)	32.1666	.0005	.0160
(girls)	26.5000	.0003	.0008
11 (boys)	36.9167	.0011	.0406
(girls)	42.7166	.0014	.0598
12	38.3368	.2470	9.4692
14	37.7944	.3120	11.7919
16 (boys)	34.8506	.0421	1.4672
(girls)	32.9655	.0726	2.3900
17 (boys)	41.8750	.0050	.2094
(girls)	44.8333	.0042	.1883
		1.0000	38.0347
		(ii) Vocational	(ii) Vocational
18	30.8586	.1171	3.6135
19	26.9055	.0416	1.1193
20	29.4808	.0281	.8255
22 (boys)	32.1249	.0127	.4079
(girls)	27.2361	.0103	.2805
23	29.8274	.0181	.5399
24	29.0749	.0075	.2181
25 (boys)	29.0044	.4843	14.0468
(girls)	29.1928	.2803	8.1827
		1.0000	29.2342

(iii) Secondary Top				(iv) Comprehensive			
26 (boys)	19.1666	.1368	2.6219	27 (boys)	33.8848	.5899	19.9886
(girls)	35.3213	.8632	30.4894	(girls)	31.0937	.4101	12.7515
Estimated Population Means:			33.1113				32.7401

APPENDIX XII

N.S.6: Estimating Error Variance of mean scores by type of school

Stratum No.	Variance Weight	1–Sampling Fraction	Variance of Stratum Mean	Sum of Variances weighted and corrected
01	.006289	.93572	1.6056	.0094485
02	.000013	.95589	0	0
03	.010465	.93652	1.3303	.1274507
04	.0000176	.88680	4.8057	.0000750
05 (boys)	.0000096	.88393	18.1730	.0001545
(girls)	.0000078	.90655	[illegible]	.0003862
06 (boys)	.0000185	.90385	4.4594	.0000745
(girls)	.0000109	.90910	.7249	.0000072
07	.0025301	.94865	4.6712	.0112118
08	.003612	.94626	1.7797	.0060828
09	.0000003	.33334	0	0
10 (boys)	.0000003	.77770	0	0
(girls)	.0000001	.54540	0	0
11 (boys)	.0000012	.72094	11.6738	.0009105
(girls)	.0000020	.29630	11.5586	.0047506
12	.061009	.94252	.4946	.0074629
14	.097344	.94160	.6023	.0052063
16 (boys)	.0017724	.95536	.2778	.0004707
(girls)	.0052563	.04040	.0666	.0000141
17 (boys)	.000025	[illegible]	19.1406	.0004345
(girls)	.0000176	.84090	43.0332	.0063690
				=.423797
18	.0137124	.88588	2.0556	.0249704
19	.0017306	.96510	7.8087	.0180421
20	.007896	.90724	2.1925	.0157062
22 (boys)	.001613	.87805	2.1925	.0031052
(girls)	.000106	.84380	72.9589	.0065225
23	.0003276	.92464	.5714	.0001731
24	.0000563	.80990	1.6750	.0000764
25 (boys)	.2345465	.96030	.6522	.1468893
(girls)	.0785681	.95190	.4739	.0354425
				=.50852
26 (boys)	.0187142	.94872	16.7656	.2976648
(girls)	.7451142	.93287	2.7932	1.941538
				=1.49639
27 (boys)	.347982	.93458	.9853	.3204363
(girls)	.168182	.913747	4.9228	.7565152
				=1.03776

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